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REPORT

OF THE

DIRECTOR OF THE MINT

UPON THE

PRODUCTION

OF THE

PRECIOUS METALS IN THE UNITED STATES

DURING THE

CALENDAR YEAR 1894.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1895.

TREASURY DEPARTMENT.
Document No. 1793.
Director of the Mint.

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LETTER OF TRANSMITTAL.

TREASURY DEPARTMENT,
BUREAU OF THE MINT,
Washington, D. C., August 22, 1895.

SIR: I have the honor to lay before you this my special report on the production of gold and silver in the United States in 1894, followed by one on that of other countries, compiled from official papers furnished the Department by foreign Governments, through the intermediary of our representatives accredited thereto, and from other trustworthy but nonofficial sources.

Respectfully, yours,

R. E. PRESTON,
Director of the Mint.

The SECRETARY OF THE TREASURY.

PART I.

PRODUCTION, EMPLOYMENT, AND MOVEMENT OF GOLD AND SILVER IN THE UNITED STATES IN 1894,

AND

SURVEY OF THE WORLD'S PRODUCTION OF GOLD AND SILVER IN 1894.

GENERAL REPORT.

PRODUCTION OF GOLD IN THE UNITED STATES IN 1894.

The United States no longer holds the first place as a gold-producing country, its output of gold in 1894 having been exceeded by that of Australasia (2,020,180 ounces, fine, of the value of $41,760,827) and by that of Africa (1,951,739 ounces, fine, of the value of $40,346,025). The gold product of South Africa alone was 1,920,310 ounces, of the value of $39,696,330.[1] The gold product of the United States in 1894 was 1,910,813 ounces, fine, of the value of $39,500,000, or 171,490 ounces, fine, valued at $3,545,000, more than in 1893. The yield of gold from the mines of the United States in 1894 was the largest since 1878, when it amounted to $51,200,000.

The annual output of gold from the mines of the United States is susceptible of very close approximation; for, of all the gold produced in the country in any year, part goes to private refineries to be there refined; part is deposited at the mints and assay offices of the United States, and part is exported in domestic gold ores and in domestic copper and argentiferous matte for reduction abroad. The sum of these several items, all of which are accurately known, and of which that of the gold bars reported by private refineries is by far the greatest, constitutes the total gold output of the country in the year.

Besides this, there is another way in which the gold product of the United States in any year may be ascertained, viz, by the disposition made of the domestic bullion and auriferous domestic ores. Part of the domestic bullion is disposed of at the mints and assay offices, being deposited at these institutions; part of it is exported; part is disposed of by private refineries to manufacturers and jewelers for employment in the arts; besides which some gold is exported in domestic gold ores and domestic copper matte. It is to be remarked, however, that an ascertainable amount of foreign gold bullion is contained in the private refineries' product of fine gold bars deposited at United States mints and assay offices, and is by them classified as "domestic production." This foreign bullion must of course be deducted from the total amount of the gold the disposition of which is classified above.

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[1] This estimate of the gold product of South Africa in 1894 is only provisional. See the paper on South Africa in Part II of this report.

Following the first of the two methods of determining the gold output of the mines of the United States described above, the table published below has been compiled:

APPROXIMATE GOLD PRODUCT OF THE MINES OF THE UNITED STATES DURING THE CALENDAR YEAR 1894.

Items of the gold product of 1894.	Ounces, fine.
Domestic product in fine gold bars reported by private refineries	1,198,025
Unrefined gold of domestic production deposited at mints and assay offices	703,739
Domestic gold ores exported for reduction	7,232
Total	1,908,996

Following the second method, the subjoined table is obtained:

APPROXIMATE DISPOSITION OF THE GOLD PRODUCT OF THE MINES OF THE UNITED STATES DURING THE CALENDAR YEAR 1894.

Disposition.	Ounces, fine.
Bullion of domestic production deposited at mints and assay offices	1,983,336
Bullion of domestic production (other than United States Mint or assay office bars) exported from the United States	7,909
Domestic gold ores exported	7,232
Bullion of domestic production reported by private refineries in the United States as having been made into bars for manufacturers and jewelers	42,420
Total	2,040,897
Deduct foreign bullion reported by private refineries in the United States as contained in their product of fine gold bars deposited at mints and assay offices and there classified as "domestic production"	129,086
Net total	1,911,811

A mean between the results shown in the above tables—that is, between the amount of gold estimated to have been produced in 1894 and the amount the disposition of which is known—that is, in round numbers $39,500,000, representing 1,910,813 ounces, fine, is as close an approximation to the actual output of gold from the mines of the United States in the calendar year 1894 as can be reached, and it is accordingly placed at these figures by this Bureau.

A glance at the following table will show how the total gold product of the country in 1893 and 1894 was shared by the several gold-producing States and Territories, and in what States and Territories there was an increase or decrease of production, as well as the amount of such increase or decrease:

TABLE SHOWING THE PRODUCT OF GOLD IN THE SEVERAL STATES AND TERRITORIES IN 1893 AND 1894 AND THE INCREASE OR DECREASE OF THE PRODUCTION OF EACH IN THE LATTER YEAR.

State or Territory.	1893.	1894.	Increase.	Decrease.
Alaska	$1,010,100	$1,113,550	$103,450	....
Arizona	1,184,200	1,784,475	600,275	....
California	12,080,000	13,570,397	1,490,397	....
Colorado	7,527,000	9,491,514	1,964,514	....
Georgia	97,200	97,736	536	....
Idaho	1,646,900	2,081,281	434,381	....
Michigan	42,000	44,444	2,444	....
Montana	3,576,000	3,651,410	75,410	....
Nevada	958,500	1,137,819	179,319	....
New Mexico	913,100	567,751	....	$345,349
North Carolina	53,600	46,594	....	7,006
Oregon	1,645,500	1,422,056	....	223,244
South Carolina	124,000	97,839	....	26,161
South Dakota	4,006,400	3,299,100	....	707,300
Utah	853,600	868,031	14,431	....
Washington	222,100	195,100	....	27,000
Alabama Maryland Tennessee Virginia Vermont Wyoming	15,000	30,903	15,903	....
Total	35,955,000	39,500,000	4,881,060	1,336,060
Net increase	....	....	3,545,000	....

The above figures are not those of the agents appointed by this Bureau to report on the production of gold and silver in the several States and Territories. They represent the share of the total gold product of the year allotted each State by this Bureau according to all the information it possesses on the output of domestic gold, whether derived from the returns of private refineries, mints, and assay offices, records of exports, or reports of agents.

PRODUCTION OF SILVER IN THE UNITED STATES IN 1894.

What was said above of the method of calculating the annual output of the gold mines of the United States might be repeated, *mutatis mutandis*, of the annual output of the silver mines of the country.

The product of silver in the United States in 1894 is calculated, like that of gold, by taking a mean between the results obtained in the two following tables:

TABLE SHOWING THE APPROXIMATE SILVER PRODUCT OF THE MINES OF THE UNITED STATES DURING THE CALENDAR YEAR 1894.

Items of the silver product of 1894.	Ounces, fine.
Domestic product in fine silver bars reported by private refineries	47,795,530
Unrefined silver of domestic production deposited at mints and assay offices	1,241,110
Silver contained in domestic pig-copper and argentiferous matte exported for reduction (approximate)	491,939
Approximate silver product for 1894	49,528,579

TABLE SHOWING THE APPROXIMATE DISPOSITION OF THE SILVER PRODUCT OF THE MINES OF THE UNITED STATES DURING THE CALENDAR YEAR 1894.

Disposition.	Ounces, fine.
Bullion deposited at mints and assay offices classified as of domestic production	5,355,520
Domestic bullion (other than United States mint or assay office bars) exported from the United States (custom-house rating at commercial value $39,241,272, corresponding at average price of silver during the year $0.63 per ounce, fine)	62,287,733
Silver contained in pig copper and matte exported from the United States, silver contents not registered (approximate)	491,939
Silver bars of domestic production furnished by private refineries to jewelers and manufacturers for industrial uses	1,847,799
Increase in the approximate stock of silver bars (exclusive of any bars bearing the stamp of a United States mint or assay office) in the United States held by the Mercantile Safe Deposit Company and other institutions at the close of the calendar year 1894, according to information furnished the Bureau of the Mint	119,336
Total	70,102,327
Deduct fine silver from private refineries in the United States deposited at the mints or entered at the custom-houses for exportation as of domestic production, but reported to this Bureau by the private refineries as derived from foreign ores	21,093,845
Approximate domestic silver product for the calendar year 1894	49,008,482

The mean of these two results being, in round numbers, about 49,500,000 ounces, fine, of the coining value of $64,000,000 and the commercial value—at the average value of an ounce, fine, during the year, of $0.63479—$31,422,000, the product of silver from the mines of the United States in the calendar year 1894 is placed at these figures, against (in round numbers) 60,000,000 ounces, fine, of the coining value of $77,575,757 and the commercial value of $46,800,000 in 1893.

It will be noticed that there was a considerable decline in the output of silver in 1894, as compared with that of 1893.

In what proportion the several silver-producing States and Territories contributed to the decline of the country's output of silver in 1894 is shown in the following table:

Table showing the Product of Silver in the Several States and Territories in 1893 and 1894 and the Increase or Decrease of the Production of Each in the Latter Year.

State or Territory.	1893.	1894.	Increase.	Decrease.
	Ounces, fine.	*Ounces, fine.*	*Ounces, fine.*	*Ounces, fine.*
Alaska	9,600	22,261	12,661	....
Arizona	2,935,700	1,147,204	....	1,788,496
California	470,100	717,368	247,268	....
Colorado	25,838,600	23,281,399	....	2,557,201
Georgia	500	325	....	175
Idaho	3,910,700	3,288,548	....	622,152
Michigan	43,500	35,122	....	8,378
Montana	16,906,400	12,820,081	....	4,086,319
Nevada	1,561,300	1,035,151	....	526,149
New Mexico	458,400	632,183	173,783	....
North Carolina	13,400	352	....	13,048
Oregon	11,800	26,171	14,371	....
South Carolina	500	305	....	195
South Dakota	140,400	58,973	....	81,427
Texas	349,400	429,314	79,914	....
Utah	7,196,300	5,891,901	....	1,304,399
Washington	152,700	113,160	....	39,540
Alabama	700	182	....	518
Maryland				
Tennessee				
Virginia				
Vermont				
Wyoming				
Total	60,000,000	49,500,000	527,997	11,027,997
Net decrease	....	....	....	10,500,000

PRODUCT OF GOLD AND SILVER REPORTED BY MINT OFFICERS AND AGENTS FOR THE INDIVIDUAL STATES AND TERRITORIES, FOR THE CALENDAR YEAR 1894.

State or Territory.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Coining value	
Alabama	194	$4, 007	66	$85	$4, 092
Alaska	62, 047	1, 282, 623	4, 422	5, 717	1, 288, 340
Arizona	96, 313	1, 990, 966	1, 539, 453	1, 990, 404	3, 981, 370
California	670, 636	13, 863, 282	229, 967	297, 331	14, 160, 613
Colorado	513, 571	10, 616, 463	23, 747, 915	30, 704, 375	41, 320, 838
Georgia	4, 772	98, 652	343	443	99, 095
Idaho	111, 687	2, 308, 775	3, 774, 349	4, 879, 966	7, 188, 741
Maryland	47	976	2	2	978
Michigan	2, 150	44, 444	35, 122	45, 410	89. 854
Montana	187, 135	3. 868, 429	13. 638, 967	17, 634, 220	21, 502, 649
Nevada	59, 051	1, 220, 700	771, 504	997, 500	2. 218, 200
New Mexico	40, 128	829, 519	214, 060	276. 764	1, 106, 283
North Carolina	2, 330	48, 167	3, 682	4, 760	52, 927
Oregon	102, 234	2, 113, 356	8, 006	10, 351	2, 123, 707
South Carolina	4, 758	98, 366	307	397	98, 763
South Dakota	187, 122	3, 868, 155	82, 256	106, 351	3, 974, 506
Tennessee	16	329	....	....	329
Texas	209	4, 320	429, 314	555, 073	559, 393
Utah	54, 570	1, 128, 062	6, 534, 182	8, 448, 235	9, 576, 297
Virginia	369	7, 621	17	22	7, 643
Washington	11, 260	232, 761	9, 683	12, 520	245, 281
Total	2, 110, 599	43, 629, 973	51, 023, 617	65, 969, 926	109, 599, 899

APPROXIMATE DISTRIBUTION BY PRODUCING STATES AND TERRITORIES OF THE PRODUCT OF GOLD AND SILVER IN THE UNITED STATES, FOR THE CALENDAR YEAR 1894, AS ESTIMATED BY THE DIRECTOR OF THE MINT.

State or Territory.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Coining value.	
Alaska	53, 868	$1, 113, 550	22, 261	$28, 782	$1, 142, 332
Arizona	86, 324	1, 784, 475	1, 147, 204	1, 483, 254	3, 267. 729
California	656, 468	13, 570, 397	717, 368	927, 506	14, 497, 903
Colorado	459, 152	9, 491, 514	23, 281, 399	30, 101, 203	39, 592, 717
Georgia	4, 728	97, 736	325	420	98, 156
Idaho	100, 682	2, 081, 281	3, 288, 548	4, 251, 860	6, 333. 141
Michigan	2, 150	44, 444	35, 122	45, 410	89, 854
Montana	176, 637	3, 651, 410	12. 820, 081	16, 575, 458	20, 226. 868
Nevada	55, 042	1, 137, 819	1, 035, 151	1, 338, 377	2, 476. 196
New Mexico	27, 465	567, 751	632, 183	817, 368	1, 385, 119
North Carolina	2, 254	46, 594	352	455	47, 049
Oregon	68. 792	1, 422, 056	26, 171	33, 837	1, 455. 893
South Carolina	4, 733	97, 839	305	394	98, 233
South Dakota	159, 594	3, 299, 100	58, 973	76, 248	3, 375, 348
Texas	....	....	429, 314	555, 073	555, 073
Utah	41, 991	868, 031	5, 891, 901	7, 617, 812	8, 485, 843
Washington	9, 438	195, 100	113, 160	146, 308	341, 408
Alabama	1, 495	30, 903	182	235	31, 138
Maryland					
Tennessee					
Virginia					
Vermont					
Wyoming					
Total	1, 910, 813	39, 500, 000	49, 500, 000	64, 000, 000	103, 500, 000

The following table shows the production of gold and silver from the mines of the United States in the years 1873 to 1894, together with the commercial and coining values of the same:

PRODUCT OF GOLD AND SILVER FROM MINES IN THE UNITED STATES, 1873-1894.

Calendar year.	Gold.		Silver.		
	Ounces, fine.	Value.	Ounces, fine.	Commercial value.	Coining value.
1873	1,741,500	$36,000,000	27,650,000	$35.750,000	$35,750,000
1874	1,620,563	33,500,000	28,849,000	36,869,000	37,300,000
1875	1,615,725	33.400,000	24,518,000	30,549,000	31,700,000
1876	1,930,162	39,900,000	30,009,000	34,690,000	38,800,000
1877	2 268,788	46,900,000	30,783,000	36,970,000	39,800,000
1878	2,476,800	51,200,000	34,960,000	40,270,000	45,200,000
1879	1,881,787	38,900,000	31,550,000	35,430,000	40,800,000
1880	1,741,500	36,000,000	30,320,000	34,720,000	39,200,000
1881	1,678,612	34,700,000	33,260,000	37,850,000	43,000,000
1882	1.572,187	32,500,000	36,200,000	41,120,000	46,800,000
1883	1,451,250	30,000,000	35,730,000	39,660,000	46,200,000
1884	1,489,950	30,800,000	37,800,000	42,070,000	48,800,000
1885	1,538,325	31,800,000	39,910,000	42,500,000	51,600,000
1886	1,693,125	35,000,000	39,440,000	39,230,000	51,000,000
1887	1,596,375	33,000,000	41,260,000	40,410,000	53,350,000
1888	1,604,841	33,175,000	45,780,000	43,020,000	59,195,000
1889	1,587,000	32,800,000	50,000,000	46,750,000	64,646,000
1890	1,588,880	32,845,000	54,500,000	57,225,000	70,465,000
1891	1,604,840	33,175,000	58,330,000	57,630,000	75,417,000
1892	1,596,375	33,000,000	63,500,000	55,563,000	82,101,000
1893	1,739,323	35,955,000	60,000,000	46,800,000	77,576,000
1894	1,910,813	39,500,000	49,500,000	31,422,000	64,000,000
Total	37,928,721	784,050,000	883,849,000	906,498,000	1,142,700,000

TABLE SHOWING THE WEIGHT OF THE DEPOSITS AND REDEPOSITS OF GOLD BULLION AT THE MINTS AND ASSAY OFFICES OF THE UNITED STATES DURING THE CALENDAR YEARS 1893 AND 1894 AND THE INCREASE OR DECREASE OF THE SAME DURING THE LATTER YEAR.

Classification of deposits of gold bullion.	Calendar year.		Increase, 1894.	Decrease, 1894.	Net decrease, 1894.
	1893.	1894.			
	Ounces, fine.	*Ounces, fine.*	*Ounces, fine.*	*Ounces, fine.*	*Ounces, fine.*
Domestic bullion, crude	656.469	703,739	47,270		
Domestic bullion, refined	1,087,755	1,279,597	191,842		
Domestic coin	83,106	[1] 61,785		21,321	
Foreign bullion	746,670	[2] 124,489		622,181	
Foreign coin	608,942	86.765		522,177	
Jewelers' bars, old plate, etc	175,212	148,099		27,113	
Total original deposits	3,358,154	2,404,474	239,112	1,192,792	953,680
Redeposits:					
Fine bars	1,484,425	1,977,917	493,492		
Unparted bars	300,321	439,165	138,844		
Totals	5,142,900	4,821,556	871,448	1,192,792	321,344

[1] Includes 28,844 ounces, fine, mutilated coins transferred for recoinage.

[2] Includes 11,791 ounces, fine, of refined foreign bullion.

TABLE SHOWING THE VALUE OF THE DEPOSITS AND REDEPOSITS OF GOLD BULLION AT THE MINTS AND ASSAY OFFICES OF THE UNITED STATES DURING THE CALENDAR YEARS 1893 AND 1894 AND THE INCREASE OR DECREASE OF THE SAME DURING THE LATTER YEAR.

Classification of deposits of gold bullion.	Calendar year.		Increase, 1894.	Decrease, 1894.	Net decrease, 1894.
	1893.	1894.			
Domestic bullion, crude	$13,570,412	$14,547,573	$977,161		
Domestic bullion refined	22,485,894	26,451,628	3,965,734		
Domestic coin	1,717,957	[1] 1,277,212		$440,745	
Foreign bullion	15,435 039	[2] 2,573,424		12,861,615	
Foreign coin	12,587,958	1,793,592		10,794,366	
Jewelers' bars, old plate, etc.	3,621,963	3,061,472		560,491	
Total original deposits	69,419,223	49,704,901	4,942,895	24,657,217	$19,714,322
Redeposits:					
Fine bars	30,685,792	40,887,181	10,201,389		
Unparted bars	6.208,165	9,078,341	2,870,176		
Totals	106.313,180	99,670,423	18,014,460	24,657,217	6,642,757

[1] Includes $596,260 mutilated coins transferred for recoinage.

[2] Includes $243,753 of refined foreign bullion.

TABLE SHOWING THE WEIGHT OF THE DEPOSITS AND REDEPOSITS OF SILVER BULLION AT THE MINTS AND ASSAY OFFICES OF THE UNITED STATES DURING THE CALENDAR YEARS 1893 AND 1894 AND THE INCREASE OR DECREASE OF THE SAME DURING THE LATTER YEAR.

Classification of deposits of silver bullion.	Calendar year.		Increase, 1894.	Decrease, 1894.	Net decrease, 1894.
	1893.	1894.			
	Ounces, fine.	*Ounces, fine.*	*Ounces, fine.*	*Ounces, fine.*	*Ounces, fine.*
Domestic bullion, crude	2,761,938	1,241,110		1,520,828	
Domestic bullion, refined	38,390,757	4,114,410		34,276,347	
Domestic coin	4,129,614	[1] 4,042,971		86,643	
Trade dollars	333	251		82	
Foreign bullion	1,637,744	[2] 1,007,747		629,997	
Foreign coin	841,373	16,688		824,685	
Jewelers' bars, old plate, etc.	551,018	498,228		52,790	
Total original deposits	48,312,777	10,921,405		37,391,372	37,391,372
Redeposits:					
Fine bars	252,177	93,537		158,640	
Unparted bars	800,617	80,644		719,973	
Totals	49,365,571	11,095,586		38,269,985	38,269,985

[1] Includes 4,036,584 ounces, fine, mutilated coins transferred for recoinage.

[2] No deposits of refined foreign bullion.

TABLE SHOWING THE VALUE OF THE DEPOSITS AND REDEPOSITS OF SILVER BULLION AT THE MINTS AND ASSAY OFFICES OF THE UNITED STATES DURING THE CALENDAR YEARS 1893 AND 1894 AND THE INCREASE OR DECREASE OF THE SAME DURING THE LATTER YEAR.

Classification of deposits of silver bullion.	Calendar year.		Increase, 1894.	Decrease, 1894.	Net decrease, 1894.
	1893.	1894.			
Domestic bullion, crude	$3, 570, 991	$1, 604, 668		$1, 966, 323	
Domestic bullion, refined	49, 636, 534	5, 319, 641		44, 316, 893	
Domestic coin	5, 339, 299	[1]5, 227, 277		112, 022	
Trade dollars	431	324		107	
Foreign bullion	2, 117, 488	[2] 1, 302, 945		814, 543	
Foreign coin	1, 087, 835	21, 576		1, 066, 259	
Jewelers' bars, old plate, etc	712, 427	644, 174		68, 253	
Total original deposits	62, 465, 005	14, 120, 605		48, 344, 400	48, 344, 400
Redeposits:					
Fine bars	326, 047	120, 937		205, 110	
Unparted bars	1, 035, 141	104, 266		930, 875	
Totals	63, 826, 193	14, 345, 808		49, 480, 385	49, 480, 385

[1] Includes $5,219,018 mutilated coins transferred for recoinage.

[2] No deposits of refined foreign bullion.

GOLD AND SILVER (NOT INCLUDING REDEPOSITS) RECEIVED AT THE MINTS AND ASSAY OFFICES DURING THE CALENDAR YEARS 1880-1894.

Calendar year.	Gold.	Silver (coining value).	Total.
1880	$100, 278, 703	$35, 103, 825	$135, 382, 528
1881	98, 763, 426	30, 326, 848	129, 090, 274
1882	41, 921, 263	35, 161, 254	77, 082, 517
1883	51, 089, 456	36, 978, 184	88, 067, 640
1884	50, 518, 179	36, 670, 731	87, 188, 910
1885	44, 714, 052	35, 836, 725	80, 550, 777
1886	66, 422, 088	39, 086, 070	105, 508, 158
1887	74, 724, 077	46, 381, 333	121, 105, 410
1888	41, 496, 410	41, 323, 973	82, 820, 383
1889	42, 599, 206	41, 977, 265	84, 576, 471
1890	48, 767, 964	55, 198, 037	103, 966, 001
1891	60, 849, 552	70, 994, 120	140, 843, 672
1892	45, 406, 646	84, 591, 898	129, 998, 544
1893	69, 419, 223	62, 465, 005	131, 884, 228
1894	49, 704, 902	14, 120, 605	63, 825, 507

COINAGE EXECUTED IN THE UNITED STATES, CALENDAR YEAR 1894.

Description.	Pieces.	Value.
Gold	6, 055, 395	$79, 546, 160. 00
Silver dollars	3, 093, 972	3, 093, 972. 00
Subsidiary silver coin	18, 320, 451	6, 106, 378. 85
Minor coin	22, 165, 264	438, 177. 92
Total	49, 635, 082	89, 184, 688. 77

BARS MANUFACTURED, CALENDAR YEAR 1894.

Description.	Gold.	Silver.
Fine bars	$19, 356, 989. 19	$8, 290, 630. 37
Mint bars	2, 119, 409. 05	98, 914. 42
Standard bars		11, 441. 85
Unparted bars	7, 160, 602. 61	414, 937. 61
Total	28, 637, 000. 85	8, 815, 924. 25

PURCHASE OF SILVER.

Since November 1, 1893, the date of the repeal of the purchasing clause of the act of July 14, 1890, the purchase of silver bullion by the Government has consisted of the silver contained in gold deposits, the small fractions of silver for return in fine bars, the amount retained in payment of charges, surplus silver bullion returned by the operative officers of the mints at the annual settlement, and mutilated domestic silver coin, purchased for the subsidiary silver coinage under the provisions of section 3526 of the Revised Statutes.

AMOUNT, COST, AVERAGE PRICE, AND BULLION VALUE OF THE SILVER DOLLAR OF SILVER PURCHASED UNDER ACT OF FEBRUARY 28, 1878.

Fiscal year.	Ounces, fine.	Cost.	Average price per ounce, fine.	Bullion value of a silver dollar
1878	10, 809, 350. 58	$13, 023, 268. 96	$1. 2048	$0. 9318
1879	19, 248, 086. 09	21, 593, 642. 99	1. 1218	. 8676
1880	22, 057, 862. 64	25, 235, 081. 53	1. 1440	. 8848
1881	19, 709, 227. 11	22, 327, 874. 75	1. 1328	. 8761
1882	21, 190, 200. 87	24, 054, 480. 47	1. 1351	. 8779
1883	22, 889, 241. 24	25, 577, 327. 58	1. 1174	. 8642
1884	21, 922, 951. 52	24, 378, 383. 91	1. 1120	. 8600
1885	21, 791, 171. 61	23, 747, 460. 25	1. 0897	. 8428
1886	22, 690, 652. 94	23, 448, 960. 01	1. 0334	. 7992
1887	26, 490, 008. 04	25, 988, 620. 46	. 9810	. 7587
1888	25, 386, 125. 32	24, 237, 553. 20	. 9547	. 7384
1889	26, 468, 861. 03	24, 717, 853. 81	. 9338	. 7222
1890	27, 820, 900. 05	26, 899, 326. 33	. 9668	. 7477
1891	2, 797, 379. 52	3, 049, 426. 46	1. 0901	. 8431
Total	291, 272, 018. 56	308, 279, 260. 71	1. 0583	. 8185

AMOUNT, COST, AVERAGE PRICE, AND BULLION VALUE OF THE SILVER DOLLAR OF SILVER PURCHASED UNDER ACT OF JULY 14, 1890.

Fiscal year.	Ounces, fine.	Cost.	Average price per ounce, fine.	Bullion value of a silver dollar.
1891	48, 393, 113. 05	$50, 577, 498. 44	$1. 0451	$0. 8083
1892	54, 355, 748. 10	51, 106, 607. 96	. 9402	. 7271
1893	54, 008, 162. 60	45, 531, 374. 53	. 8430	. 6520
1894	11, 917, 658. 78	8, 715, 521. 32	. 7313	. 5656
Total	168, 674, 682. 53	155, 931, 002. 25	. 9244	. 7150

AMOUNT, COST, AVERAGE PRICE, AND BULLION VALUE OF THE SILVER DOLLAR OF SILVER PURCHASED UNDER ACTS OF FEBRUARY 28, 1878, AND JULY 14, 1890.

RECAPITULATION.

Act.	Ounces, fine.	Cost.	Average price per ounce, fine.	Bullion value of a silver dollar.
Act 1878	291, 272, 018. 56	$308, 279, 260. 71	$1. 0583	$0. 8185
Act 1890	168, 674, 682. 53	155, 931, 002. 25	. 9244	. 7150
Total	459, 946, 701. 09	464, 210, 262. 96	1. 0093	. 7806

TABLE SHOWING THE WEIGHT, COST, AND AVERAGE PRICE, PER FINE OUNCE, OF THE SILVER PURCHASED BY THE UNITED STATES UNDER ACTS OF FEBRUARY 12, 1873; JANUARY 14, 1875; FEBRUARY 28, 1878, AND JULY 14, 1890.

Act authorizing.	Ounces, fine.	Cost.	Average cost per ounce.
February 12, 1873	5, 434, 282	$7, 152, 564	$1. 314
January 14, 1875	31, 603, 906	37, 571, 148	1. 189
February 28, 1878	291, 272, 019	308, 279, 261	1. 058
July 14, 1890	168, 674, 682	155, 931, 002	. 924
Total	496, 984, 889	508, 933, 975	1. 024

TABLE SHOWING THE SILVER PURCHASED FOR SUBSIDIARY COINAGE DURING THE CALENDAR YEAR 1894.

Stock.	Ounces, fine.	Cost.
Partings, charges, and fractions purchased	211, 223. 41	$137, 777. 31
Mutilated coins, including melted assay coins purchased	3, 150. 58	2, 741. 36
Surplus bullion purchased	10, 345. 79	6, 624. 29
Total	224, 719. 78	147, 142. 96

TABLE SHOWING QUANTITY AND COST OF SILVER PURCHASED AT EACH MINT FOR THE SUBSIDIARY COINAGE DURING THE CALENDAR YEAR 1894.

Mint.	Ounces, fine.	Cost.
Philadelphia	178, 162. 50	$118, 624. 46
San Francisco	40, 274. 08	24, 678. 98
New Orleans	3, 636. 42	2, 197. 41
Carson	2, 646. 78	1, 642. 11
Total	224, 719. 78	147, 142. 96

BALANCE OF SILVER PURCHASED UNDER ACT OF JULY 14, 1890, ON HAND AT EACH MINT JANUARY 1, 1895.

Mint.	Ounces, fine.	Cost.
Philadelphia	118, 906, 621. 56	$107, 625, 330. 54
San Francisco	11, 012. 393. 56	9, 877, 203. 87
New Orleans	7, 652, 266. 14	6, 570, 788. 15
Carson	735, 401. 87	588, 743. 30
Total	138, 306, 683. 13	124, 662, 065. 86

IMPORTS AND EXPORTS OF THE PRECIOUS METALS.

GOLD.—During the calendar year 1894 foreign gold bullion of the value of $2,314,101 was imported into the United States, of which amount $1,064,721 came from Mexico, $420,882 from Colombia, $326,883 from British Columbia, $238,459 from British Australasia, and $121,425 from Nicaragua; the remainder was principally from Central American States.

The value of the foreign gold coins imported was $14,610,965, of which amount $6,269,068 came from France, $3,608,161 from Cuba, $1,713,954 from England, $1,577,999 from Germany, $821,036 from Quebec and Ontario, $493,260 from British Australasia, and the remainder from the West Indies, South and Central America.

Foreign gold ores of the invoiced value of $743,046 were imported for reduction, all of which came from Mexico except about $69,000, which came from British Columbia.

The value of the United States gold coins returned during the year was $3,682,495, of which $984,207 came from England, $795,832 from Quebec and Ontario, $464,031 from Cuba, $357,696 from Colombia, $356,321 from the West Indies, $305,062 from Venezuela, $169,058 from Mexico, and the remainder from other countries.

The total gold imports for the calendar year 1894 are shown in the following table:

GOLD IMPORTS, 1894.

Items.	Amount.
Foreign bullion	$2, 314, 101
Foreign coin	14, 610, 965
Foreign ores	743, 046
Total foreign	17, 668, 112
United States coin	3, 682, 495
Total imports	21, 350, 607

The value of United States gold bars bearing the stamp of a United States mint or assay office, exported during the calendar year 1894, was $45,998, all of which was sent to Quebec and Ontario.

The value of other domestic gold bullion exported was $163,494; of this amount $103,000 went to France, $56,354 to Quebec and Ontario, and the remainder to England and Hongkong.

The value of the United States gold coins exported during the year was $87,624,515, of which $35,950,000 was shipped to Germany, $30,079,000 to France, $15,103,500 to England, $3,131,842 to Quebec and Ontario, $725,000 to the Netherlands, $601,985 to the Hawaiian Islands, $535,839 to South American States, $322,080 to the Central American States, $567,644 to the West Indies, $455,000 to Cuba and Puerto Rico, and $90,346 to Hongkong.

Domestic gold ores of the invoiced value of $149,501 were exported. Of this amount $122,095 went to England and $27,347 to Germany.

Foreign gold coins of the value of $13,985,917 were reexported, of which amount $11,722,451 went to Cuba, $1,977,000 to France, $236,285 to the United Kingdom, and the remainder to Central and South America.

The invoiced value of foreign gold ores reexported to England was $19,328.

The total gold exports for the year will be found in the following table:

Gold Exports, 1894.

Items.		Amount.
United States bars		$45,998
Other domestic bullion		163,494
Domestic coin		87,624,515
Domestic ores		149,501
Total domestic		87,983,508
Foreign coin reexported	$13,985,917	
Foreign ores reexported	19,328	
Total foreign		14,005,245
Total gold exports		101,988,753

Silver.—There were imported during the year 5,993,642 ounces of foreign silver bullion, of the commercial value of $3,553,178. Of this amount $3,162,767 came from Mexico, $340,465 from Colombia, and the remainder principally from Central and South America.

The invoiced value of the silver imported in foreign ores was $7,809,186, of which $7,411,304 came from Mexico and $351,415 from British Columbia.

These silver-lead ores contained 39,495,957 pounds of lead, valued at $451,477, and 2,199,630 pounds of copper, valued at $168,226.

The quantity and value of the metals contained in these ores is shown in the following table, kindly furnished by the Chief of the Bureau of Statistics:

STATEMENT SHOWING, BY CUSTOMS DISTRICTS, THE QUANTITIES AND VALUES OF GOLD, SILVER, COPPER, AND LEAD CONTAINED IN ORE, AS FAR AS COULD BE ASCERTAINED, IMPORTED INTO THE UNITED STATES DURING THE YEAR ENDING DECEMBER 31, 1894.

Customs districts.	Gold.		Silver.		Copper.		Lead.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ounces.		*Ounces.*		*Pounds.*		*Pounds.*	
Arizona	11, 356	$227, 128	1, 162, 936	$671, 983	176, 409	$8, 827	1, 130, 508	$22, 613
Bangor, Me		700						
Corpus Christi, Tex	2, 843	58, 200	954, 207	597, 248	1, 711, 078	131, 808	1, 819, 066	22, 327
Detroit, Mich		6						
Montana and Idaho			36, 723	22, 034				
New York, N. Y		84, 711	[1]4, 418, 187	2, 650, 912				
North and South Dakota		500	1, 580	995				
Omaha, Nebr			198, 099	118, 143				
Paso del Norte, Tex	13, 212	264, 209	4, 705, 002	2, 653, 316	79, 164	6, 622	32, 101, 412	350, 409
Puget Sound, Wash		67, 525	336, 084	221, 643				
Saluria, Tex	724	14, 135	556, 186	314, 985			3, 483, 790	33, 598
San Diego, Cal		970	530	334				
San Francisco, Cal	434	8, 966	517, 692	327, 097	232, 979	20, 969	961, 181	22, 530
Total		727, 050	12, 887, 226	7, 578, 690	2, 199, 630	168, 226	39, 495, 957	451, 477

[1] Estimated at 60 cents per ounce.

Foreign silver coins of the value of $6,177,115 were imported, of which $4,772,304 came from Mexico, $347,390 from the United Kingdom, $386,994 from the West Indies, and the remainder from South and Central American States.

Domestic silver coins (principally subsidiary) of the value of $94,115 were imported from various countries.

The items comprising the silver imports are as follows:

IMPORTS OF SILVER, 1894.

Items.	Amount.
Foreign bullion (commercial value)	$3, 553, 178
Silver in foreign ores (commercial value)	7, 809, 186
Foreign silver coin	6, 177, 115
Total foreign	17, 539. 479
United States silver coin	94, 115
Total silver imports	17, 633, 594

The exports during the year of domestic silver bullion bearing the stamp of a United States mint or assay office were 171,810 ounces, valued at $110,233, of which $44,350 were shipped to Japan, $34,003 to Quebec and Ontario, and $31,880 to Hongkong.

The exports of other domestic bullion were valued at $39,241,272. Of this amount $30,880,321 went to England, $4,838,250 to Japan, $1,395,420 to Hongkong, $978,300 to China, $369,773 to Colombia, $306,482 to Guatemala, $201,000 to France, and $159,500 to Germany.

The exports of United States subsidiary silver coins were $58,829, of which $30,141 went to the Dominion of Canada, $18,738 to Mexico, $5,000 to the Hawaiian Islands, and the remainder to the West Indies.

Foreign silver bullion valued at $61,490 was reexported, all of which went to Mexico.

Foreign silver coins, principally Mexican dollars, of the value of $7,572,381 were reexported; $4,609,343 of this amount went to Hongkong, $1,124,175 to the United Kingdom, $706,700 to Japan, $424,450 to Mexico, $231,180 to the West Indies, $117,781 to Central American States, and the remainder to South American States.

Silver in foreign ores of the value of $62,584 were reexported to England for reduction.

Reports received from private refineries show there were 491,939 ounces of fine silver exported in pig copper, etc., which at the average commercial price of silver during the year would have a value of $312,381.

There was no silver exported in copper matte during the year, as is shown by the following letters received from the collector of customs of Baltimore and the superintendent of the United States Assay Office at New York:

OFFICE COLLECTOR OF CUSTOMS, PORT OF BALTIMORE,
January 31, 1895.

SIR: Responding to your letter of the 29th instant requesting a statement of the exports of copper matte from this port during the calendar year 1894, I have the honor to state that there has been no copper matte exported from this port since November, 1893.

Respectfully, yours,

JAMES A. DIFFENBAUGH,
Special Deputy Collector.

DIRECTOR OF THE MINT,
Washington, D. C.

THE UNITED STATES ASSAY OFFICE AT NEW YORK,
SUPERINTENDENT'S OFFICE,
March 15, 1895.

SIR: In reply to your letter of January 29 relative to the amount of copper matte and argentiferous matte exported from this port during the calendar year 1894, with the quantity of gold and silver contained, I have to report that the amount, according to the custom-house records, was, copper matte, 9,280,320 pounds. It contained no gold or silver. In explanation of the last statement I am informed by the shippers that the introduction of electricity as a means of parting has made it to their advantage to have this class of metal treated in this country.

Respectfully, yours,

JAMES W. CORSA,
Acting Superintendent.

DIRECTOR OF THE MINT,
Washington, D. C.

The United States Assay Office at New York,
Superintendent's Office,
March 25, 1895.

Sir: In reply to your letter of the 23d instant, I would say that exports of copper are classified at the custom-house as follows:

Copper ore.—Weight, value.

Copper ingots, bars, etc.—Weight, value.

Copper matte is classified under copper ore, while pig copper is entered as ingots, bars, etc.

There is no record kept as to the gold and silver contained.

Respectfully, yours,

James W. Corsa,
Acting Superintendent.

Director of the Mint,
Washington, D. C.

The following table exhibits the total exports of silver for the year:

Exports of Silver, 1894.

Items.		Amount.
United States bars		$110,233
Other domestic bullion		39,241,272
United States subsidiary silver coin		58,829
Silver contained in pig copper, etc		312,381
Total domestic		39,722,715
Foreign bullion reexported	$61,490	
Foreign silver coin reexported	7,572,381	
Silver in foreign ores reexported	62,584	
Total foreign		7,696,455
Total silver export		47,419,170

In Part III will be found a table exhibiting the imports and exports of the precious metals by customs districts and by months for the calendar year 1894, kindly compiled by the Chief of the Bureau of Statistics.

MOVEMENT OF GOLD FROM THE UNITED STATES.

The superintendent of the United States Assay Office at New York has kindly prepared the following tables, giving the exports and imports of gold from the port of New York to Europe during the calendar year 1894:

STATEMENT OF UNITED STATES GOLD COIN EXPORTED FROM THE PORT OF NEW YORK TO EUROPE DURING THE CALENDAR YEAR ENDED DECEMBER 31, 1894.

Date.	Destination.	Value.	Rate of exchange.
March 2	France	$1,250,000	$4.88¼
March 16	England	1,250,000	4.88¾
April 6	Germany	225,000	4.88½
April 11	do	250,000	4.88½
April 13	France	2,700,000	4.88¾
April 13	England	500,000	4.88¾
April 20	France	3,000,000	4.88¼
April 27	England	1,200,000	4.88¾
May 2	do	1,000,000	4.88¾
May 3	Germany	1,500,000	4.88¾
May 4	England	1,550,000	4.88¾
May 4	Germany	250,000	4.88¾
May 4	France	520,000	4.88¾
May 7	Germany	1,200,000	4.88¾
May 8	England	3,500	4.88¾
May 9	Germany	1,900,000	4.88¾
May 11	England	600,000	4.88¾
May 11	France	1,675,000	4.88¾
May 11	Germany	500,000	4.88¾
May 16	England	1,500,000	4.88¾
May 17	Germany	1,250,000	4.88¾
May 18	England	750,000	4.88¾
May 18	Germany	600,000	4.88¾
May 18	France	700,000	4.88¾
May 18	England	1,500,000	4.88¾
May 21	Germany	500,000	4.88¾
May 21	England	800,000	4.88¾
May 22	do	500,000	4.88¾
May 23	do	300,000	4.88¾
May 23	Germany	1,500,000	4.88¾
May 25	France	250,000	4.88¾
May 25	England	500,000	4.88¾
May 28	Germany	1,000,000	4.88¾
May 31	do	2,000,000	4.88¾
June 1	France	500,000	4.88¾
June 1	Germany	1,250,000	4.88¾
June 1	England	500,000	4.88¾
June 4	Germany	1,400,000	4.88¾
June 6	do	1,750,000	4.88¾
June 7	do	2,500,000	4.88¾
June 11	do	1,000,000	4.88¾
June 14	England	750,000	4.88¾
June 15	Germany	500,000	4.88¾
June 18	do	2,000,000	4.88¾
June 20	do	2,250,000	4.88¾
June 22	France	3,500,000	4.88¾

STATEMENT OF UNITED STATES GOLD COIN EXPORTED, ETC.—Continued.

Date.	Destination.	Value.	Rate of exchange.
June 25	Germany	$1,000,000	4.88¾
June 27	do	500,000	4.88½
June 29	France	1,250,000	4.88¼
July 2	Germany	350,000	4.88¼
July 6	France	750,000	4.88
July 12	Germany	600,000	4.88¼
July 18	do	800,000	4.88¼
July 20	France	2,500,000	4.88¼
July 23	Germany	500,000	4.83¼
July 27	France	2,550,000	4.88½
July 28	Germany	2,250,000	4.88½
July 30	do	500,000	4.88½
August 1	England	850,000	4.88½
August 3	France	1,750,000	4.88½
August 10	Germany	500,000	4.88½
August 24	France	4,000	4.86½
October 15	Germany	500,000	4.87¾
October 19	do	500,000	4.87½
December 7	France	1,250,000	4.88½
December 14	do	3,530,000	4.88¾
December 17	Germany	1,750,000	4.88¾
December 21	France	1,550,000	4.88½
December 21	Germany	500,000	4.88½
December 28	France	850,000	4.88½

RECAPITULATION.

Exports.	Value.
Total United States gold coin	$79,707,500
Foreign coin	2,333,499
Gold bars	105,251
Total shipments to Europe	82,146,250

During the same period there were shipped to the West Indies, Central and South America, the following amounts:

Exports.	Value.
United States gold coin	$1,560,103
Foreign coin	11,462,190
Gold bars	700
Total	13,022,993
Grand total of exports	95,169,243

The imports of gold during the same period were as follows:

Imports.	Value.
From Europe:	
United States gold coin	$57,541
Foreign coin	9,579,867
Gold bullion	2,702
Total	9,640,110
From Mexico, Central and South America, and West Indies:	
United States gold coin	2,555,308
Foreign coin	3,723,573
Gold bullion	618,286
Total	6,897,167
Grand total of imports	16,537,277

IMPORTS AND EXPORTS OF GOLD AND SILVER AT SAN FRANCISCO DURING THE CALENDAR YEAR ENDING DECEMBER 31, 1894.

IMPORTS.

Source.	Silver bullion.	Silver coin.	Gold bullion.	Gold coin.	Total.
China		$132		$16,605	$16,737
San Salvador			$3,875	33,750	37,625
Chile and all islands, etc.	$11,500	39,612			51,112
British Possessions in Australasia			238,459	497,103	735,562
Hawaiian Islands		5,000			5,000
French Possessions		3,909		260	4,169
Guatemala		1,974		44,142	46,116
Japan		1,000		13,700	14,700
Mexico	1,212,148	929,801	103,208	85,519	2,330,676
British Columbia			326,883	4,604	331,487
Total	1,223,648	981,428	672,425	695,683	3,573,234

EXPORTS.

Destination.	Silver bullion.	Silver coin (foreign).	Gold bullion.	Gold coin.	Total.
San Salvador		$46,045		$86,900	$132,945
China	$978,300				978,300
Hawaiian Islands		5,000		601,985	606,985
Japan	4,882,600	676,700			5,559,300
Hongkong	1,427,300	4,609,343	$1,615	90,346	6,128,604
Guatemala	108,224	440		230,180	338,844
Mexico		18,660		20	18,680
Total	[1] 7,396,424	5,356,188	1,615	1,009,431	13,763,658

[1] Of which $76,230 was United States Mint bars.

IMPORTS INTO THE CUSTOMS DISTRICT OF NEW ORLEANS, LA., OF GOLD AND SILVER DURING THE CALENDAR YEAR 1894.

Country.	Gold.			Silver.			Total value.
	Foreign bullion.	Coin.		Foreign bullion.	Coin.		
		American.	Foreign.		American.	Foreign.	
British Honduras	$9,089	$2,000				$320,765	$331,854
Honduras	658					11,099	11,757
Cuba					$1,200		1,200
Guatemala	6,660					2,406	9,066
Mexico						4,359	4,359
Nicaragua	85,664						85.664
Total	102,071	2,000			1.200	338,629	443,900

COURSE OF SILVER FOR THE CALENDAR YEAR 1894.

On the 2d of January fine bar silver in London was quoted at 31½ pence, equivalent in United States money to $0.68888. The New York price was $0.6875; at par of exchange ($4.8665), $0.69051.

January 6 the price advanced to 31¾ pence, which was the highest quotation during the year, and equivalent in United States money to $0.69506. The New York price was $0.6975; at par of exchange, $0.69599.

The 3d of March it was quoted at 27 pence, the lowest point reached during the year, equivalent to $0.59381. The New York quotation was $0.60, equal at par of exchange to $0.59187.

The average price for the year was 28⅞ pence, at par of exchange equivalent to $0.63479, and at the average rate of exchange to $0.63624. The New York price was $0.64043.

Ratio of gold to silver, 1 to 32.56.

Bullion value of a United States silver dollar, $0.49097; bullion value of two United States half dollars, $0.45919.

Grains of silver, at average price, purchasable with a United States silver dollar, 756.04, equivalent to 1.575 ounces, fine.

HIGHEST, LOWEST, AND AVERAGE PRICE OF SILVER BULLION AND THE VALUE OF AN OUNCE, FINE, EACH MONTH DURING THE CALENDAR YEAR 1894.

Month.	Highest.	Lowest.	Average price per ounce, British standard (.925).	Equivalent value of an ounce, fine, with exchange at par ($4.8665).	Average monthly price at New York rate of exchange on London.	Equivalent value of an ounce, fine, based on average monthly price and average rate of exchange.	Average monthly New York price of fine bar silver.
	Pence.	*Pence.*	*Pence.*				
January	$31\frac{3}{4}$	$30\frac{1}{2}$	30.339	$0.68698	$4.8653	$0.68694	$0.68980
February	$30\frac{3}{4}$	$27\frac{1}{2}$	29.169	.63942	4.8749	.64052	.64664
March	28	27	27.286	.59814	4.8846	.60037	.60513
April	$29\frac{3}{8}$	$28\frac{1}{8}$	28.802	.63137	4.8853	.63382	.64065
May	$29\frac{1}{4}$	$28\frac{1}{16}$	28.704	.62923	4.8875	.63180	.63610
June	$28\frac{15}{16}$	$28\frac{5}{16}$	28.685	.62880	4.8867	.63129	.63780
July	$28\frac{15}{16}$	$28\frac{7}{16}$	28.673	.62854	4.8828	.63041	.63290
August	$30\frac{1}{2}$	$28\frac{11}{16}$	29.377	.64398	4.8728	.64474	.64810
September	$30\frac{1}{4}$	$29\frac{3}{16}$	29.588	.64861	4.8620	.64802	.65026
October	$29\frac{9}{16}$	$28\frac{15}{16}$	29.150	.63900	4.8744	.64005	.64222
November	$29\frac{5}{16}$	$28\frac{3}{8}$	28.977	.63520	4.8748	.63628	.64065
December	$28\frac{1}{2}$	$27\frac{3}{16}$	27.747	.60825	4.8855	.61063	.61490
Average	....	....	28.875	.63479	4.8780	.63624	.64043

INDIA AND THE SILVER QUESTION.

By PROFESSOR W. LEXIS.

The consequences of the experiment made by the Anglo-Indian Government on the 26th of June, 1893, can not yet be surveyed in their entirety, and it is scarcely to be assumed that any State will take a step in the solution of the silver question before experience has shown whether the closing of the Indian mints can be permanently maintained, and at what price, in that event, an approximately stable equilibrium may be brought about between the production and consumption of silver. Thus far the price of silver, notwithstanding its great decline, has asserted itself much better than one could have supposed against the two powerful blows which it received by the Indian measure above named and by the suspension of the purchase of silver by the United States. At the beginning of 1894 the price of silver stood at $31\frac{1}{2}$ pence per ounce of standard fineness; during the month of March it sank to 27 pence after the Indian Government had decided to sell council bills below the rate of $15\frac{1}{4}$ pence; but in April an active demand from China and Japan began, and the price rose gradually to 29 pence. The outbreak of the war between the two Asiatic nations in August awakened new hopes of an increased outflow of silver, and brought the price at the end of that month up to $30\frac{1}{4}$ pence. Since then, however, there has been a steady retrograde movement, so that the price has again fallen to between $27\frac{1}{4}$ and $27\frac{1}{2}$ pence. The London price of silver in 1894 averaged $28\frac{15}{16}$ pence, against $35\frac{5}{8}$ in 1893 and $39\frac{13}{16}$ in 1892.

But when it is considered that there was a falling off in the demand for silver of from 2,750,000 to 3,000,000 kilograms in consequence of the closing of the Indian mints and the suspension of the purchase of silver by the United States, one can only be surprised that there was not in 1894 a greater divergence from the figures of 1893. Even the price of 27 pence would be looked upon as a very favorable one under the circumstances, if it were to be expected that the price would continue at that figure with only slight deviations from it. We should then have a firm basis on which to judge how large an amount of silver might still be employed by civilized nations for monetary purposes.

However, before it can be decided whether that price can be maintained, a longer observation of the monetary condition of India is necessary, and all theoretical predictions have been so thoroughly demonstrated to be fallacious by the actual course of events in India that we are forced to await the acquisition of further knowledge from experience. The Indian Government resolved on the measure it took in 1893 in the hope that it would succeed in making the course of the rupee independent of the price of silver and to fix it at at least 16 pence. This expectation was by no means unfounded. Austria-Hungary had succeeded simply by the suspension of silver coinages on private account in raising the value of its coined gulden to 25 per cent more than its bullion value. England, indeed, did not grasp the matter even theoretically correctly. It believed that the rise in value of the rupees could be produced by their greater rarity or by increasing their purchasing power in the interior, while really there was only a question of influencing the Anglo Indian rate of exchange.

England's balance of trade with India is always unfavorable, and even the £16,000,000 to £17,000,000 which India has to pay every year for interest, pensions, etc., is not sufficient to settle the balance. Thus, in 1892, £9,500,000 in silver had to be shipped to India in order to settle the balance of trade of India against England. The silver coinages of India in that year (1892) were about equal to its import of silver. The idea, therefore, readily suggested itself that the council bills and drafts on India would again attain the rate of 16 pence, which they had reached in 1892, if they were freed from the competition of silver, which might be transformed (to an unlimited amount) into legal-tender coins by the payment of a small mint charge. And, indeed, a difference between the rupee and the market value of the silver contained in it has been maintained, but the severance of the course of the rupee from the value of silver has not been attained. Rather has the former followed the decline of the latter, but with some deviations from it.

After an effort had been made in London for some months by abstention from the sale of council bills to keep the rate of exchange at 15¼ pence, the home Government was at last obliged, on account of the ever-growing financial embarrassment of the Indian Government, to give up their resistance, and it thus happens that the rupee is worth between 12¾ and 13 pence. The simultaneous advance in the price of silver from 27¼ to 27½ pence would correspond to a rate of exchange of 10⅝ pence, which would make the rate of exchange of the rupee 20 per cent greater than its bullion value. During the financial year which began April 1, 1894, there was no difficulty in disposing of government bills at an average rate of more than 13 pence, sufficient to warrant the belief that the £16,000,000 to be paid by India would have been entirely procured; but the burden of the Indian budget, which is calculated in rupees, increased still more, in the proportion of 15 to 13, in consequence of the decline of the rate of exchange, as compared with the year 1892–93, and the real object of the suspension of the coinage of silver in India has, therefore, not been attained.

How is this depreciation of the rupee to be explained, notwithstanding the fact that the export of commodities from India during the financial year 1893–94 exceeded the imports by 325,000,000 rupees?

The balance has become still more favorable during the current year, so that the excess in the exports of commodities up to the end of March would amount to more than 400,000,000, to say nothing of the large export of gold from India. On the other hand, there was shipped from England to India, in 1894 alone, silver to the value of £5,934,000, and although this sum is considerably smaller than the corresponding figures of the previous year (£8,697,000), it must be borne in mind that it would have amounted to £7,000,000 at the average price of silver in 1893, and that therefore this export in 1894 declined quantitatively only about 20 per cent. This, again, was an entirely unexpected result. When it was seen that the outflow of silver to India continued in undiminished quantities during the months immediately following the closing of the mints, an effort was made to explain it, partly by the assumption that the population of India had not yet formed a clear idea of what that measure meant, and therefore believed that they were driving a good bargain when they purchased bar silver at the price asked in rupees. But after it was apparent that India's power of absorption of silver continued to be very great, for more than a year and a half after the closing of the India mints to the coinage of that metal, it became undoubted that silver was still considered by the Indian population as treasure and that it was still being hoarded by them. Previously silver was hoarded mostly in the form of rupees, which explains why, notwithstanding the large annual coinages, the purchasing power of the rupee in the interior decreased so little; now, however, in consequence of the declined price, bar silver and coarse articles of ornament are used for this purpose. Hence it is that silver has not ceased to compete with the council bills. It still continues to be material for arbitrage; although it can no longer be transformed into a medium of legal tender payment, and is therefore of smaller value than the rupee, it is considered in India to be a commodity which is very much sought after, and which may be disposed of with very great facility. When the Indian rate of exchange in England, therefore, has reached a certain level, it will be more profitable to ship silver than to buy exchange, and the price of the latter will consequently be depressed by large offerings of silver.

It remains to be seen whether the nearly 300,000,000 souls that constitute the population of India will permanently favor silver in this way. Considering the tenacity with which India's people hold to their old customs and views, it would seem probable that this question will be answered in the affirmative. If it be, we would not only have to calculate in future on a pretty certain market for about 1,500,000 kilograms of silver, but the danger would be removed of India's absorbing large quantities of gold instead of the amounts of silver it formerly absorbed. If the Indian decree of June 26, 1893, had had the effect intended by its originators, the danger just mentioned would have become very serious, and England would have felt first of all the intensified competition of the East for gold, and would have felt it severely. In reality, however, the very opposite of what was expected has happened, and it seems that India has even exchanged some gold for silver. At all events, its export of gold has largely increased, for England drew in 1894 more gold from India than from the United States, to wit, not less than £3,381,000 against £1,190,000.

England will maintain a silver standard in its possessions in Farther India, for the mint at Bombay will soon begin the coinage of a silver dollar corresponding to the Japanese yen, and it hopes that this dollar will be widely disseminated in the rest of Eastern Asia as a trade coin. Japan will probably, now that the war is ended, make an effort to introduce the gold standard. On the other hand, it may be assumed as certain that China will continue on the silver basis and that the export of that metal thither will be greater in the future than in the past. In the year 1894 England alone exported £3,151,000 of silver to China, which represented a weight of 700,000 kilograms. It is therefore very possible that even under present conditions 2,000,000 kilograms of silver may be absorbed yearly by Eastern Asia. The industrial consumption of silver in Europe and America in 1894 increased about 1,000,000 kilograms in consequence of the low price of the metal. If we now consider what is consumed by Mexico and the other American silver-standard countries in coinage for their own trade, and the coinages of the subsidiary silver coins in all countries, it seems probable that at the price of 27 pence an outlet for 3,500,000 kilograms can be found.

STOCK OF MONEY IN THE UNITED STATES.

The following table gives the total estimated stock of gold and silver coin in the United States on January 1, 1895, as $1,076,219,251; gold, $577,182,792; silver, $499,036,459:

OFFICIAL TABLE OF STOCK OF COIN IN THE UNITED STATES JANUARY 1, 1895.

Items.	Gold.	Silver.	Total.
Estimated stock of coin January 1, 1894	$584,366,998	$495,700,363	$1,080,067,361
Coinage, calendar year 1894	79,546,160	9,200,351	88,746,511
Net imports of United States coin, calendar year 1894		35,286	35,286
Total	663,913,158	504,936,000	1,168,849,158
Loss:			
Net exports of United States coin, calendar year 1894	83,942,020		83,942,020
United States coin melted for recoinage, calendar year 1894	1,288,346	5,799,541	7,087,887
United States coin estimated to have been used in the arts, calendar year 1894	1,500,000	100,000	1,600,000
Total	86,730,366	5,899,541	92,629,907
Estimated stock of the United States coin January 1, 1895	577,182,792	499,036,459	1,076,219,251

NOTE.—Of the silver coins $422,426,749 were in dollars and $76,609,710 were in subsidiary coins.

The gold and silver coins melted for recoinage are given at their nominal values, and, in addition to the transfers from the Treasury to the mints, include all mutilated coins of each class purchased at the mints and assay offices.

The value of the gold and silver bullion owned by the Government, in the mints and assay offices, on January 1, 1895, was as follows:

GOLD AND SILVER BULLION IN MINTS AND ASSAY OFFICES JANUARY 1, 1895.

Metal.	Cost value.
Gold	$47,106,966
Silver	126,044,414
Total	173,151,380

The stock of silver bullion on deposit with the Mercantile Safe Deposit Company in New York City on January 1, 1895, was 174,721 ounces, fine, of the commercial value of $111,821.

The total metallic stock of the United States on January 1, 1895, that is, the stock of coin in the United States, the gold and silver bullion owned by the Government, together with the silver held by the Mercantile Safe Deposit Company, is shown in the following table:

METALLIC STOCK JANUARY 1, 1895.

Coin and bullion.	Amount.
Gold	$624, 289, 758
Silver (bullion in mints and Mercantile Safe Deposit Company)	625, 192, 694
Total	1, 249, 482, 452

The estimated metallic stock of the United States at the commencement of the calendar year was as follows:

METALLIC STOCK JANUARY 1, 1894.

Coin and bullion.	Amount.
Gold	$668, 998, 964
Silver (bullion in mints and Mercantile Safe Deposit Company)	624, 179, 950
Total	1, 293, 178, 914

It will be seen that the stock of gold decreased during the calendar year $44,709,206, while that of silver increased $1,012,744, showing a total decrease of $43,696,462.

The stock of metallic and paper money in the United States on January 1, 1895, is shown in the following table:

LOCATION OF THE MONEYS OF THE UNITED STATES JANUARY 1, 1895.

Moneys.	In Treasury.	Outside of Treasury.	Total.
METALLIC.			
Gold bullion	$47, 106, 966	....	$47, 106, 966
Silver bullion	126, 044, 414	$111, 821	126, 156, 235
Gold coin	91, 781, 176	485, 401, 616	577, 182, 792
Silver dollars	364, 601, 770	57, 824, 979	422, 426, 749
Subsidiary silver coin	14, 466, 043	62, 143, 667	76, 609, 710
Total	644, 000, 369	605, 482, 083	1, 249, 482, 452
PAPER.			
Legal-tender notes, old issue	83, 373, 119	263, 307, 897	346, 681, 016
Legal-tender notes, act July 14, 1890	28, 488, 267	122, 335, 464	150, 823, 731
Gold certificates	60, 980	53, 359, 889	53, 420, 869
Silver certificates	5, 810. 476	331, 114, 028	336, 924, 504
National-bank notes	4, 770, 479	201, 835, 231	206, 605, 710
Currency certificates	2, 160, 000	47, 175, 000	49, 335, 000
Total	124, 663, 321	1, 019, 127, 509	1, 143, 790, 830

The total amount of money in circulation in the United States on January 1, 1895, exclusive of the amount in the Treasury, was $1,624,609,592, while on January 1, 1894, the amount was $1,728,038,375, showing a decrease in circulation on January 1, 1895, of $103,428,783.

GOLD AND SILVER USED IN THE INDUSTRIAL ARTS.

For the purpose of ascertaining the amount of gold and silver used in the industrial arts and manufactures in the United States during the calendar year 1894, inquiries were made of Government institutions and private refineries, as has been the custom in former years.

In answer to these inquiries statements were received showing the amount and value of gold and silver in bars sold to manufacturers and jewelers for industrial use, and as nearly as possible the class of material used in the manufacture of such bars.

The following table shows the quantity and value of gold and silver in bars furnished to manufacturers and jewelers by the United States Assay Office at New York during the calendar year 1894:

BARS MANUFACTURED FOR USE IN THE INDUSTRIAL ARTS BY THE UNITED STATES ASSAY OFFICE AT NEW YORK DURING THE CALENDAR YEAR 1894.

Material used.	Gold.		Silver.	
	Ounces, fine.	Value.	Ounces, fine.	Coining value.
Domestic bullion	230, 471. 902	$4, 764, 277. 04	4, 779, 374. 48	$6, 179, 393. 25
Foreign material	26, 295. 924	543, 584. 99	759, 824. 14	982, 398. 90
Old plate, jewelry, etc	64, 088. 335	1, 324, 823. 48	434, 237. 68	561, 438. 62
Total	320, 856. 161	6, 632, 685. 51	5, 973, 436. 30	7, 723, 230. 77

The following table shows the amount and value of gold and silver in bars furnished manufacturers and jewelers by the United States Mint at Philadelphia during the calendar year 1894:

VALUE AND WEIGHT OF GOLD AND SILVER BARS MANUFACTURED FOR USE IN THE INDUSTRIAL ARTS BY THE UNITED STATES MINT AT PHILADELPHIA DURING THE CALENDAR YEAR 1894.

Material used.	Bars manufactured.			
	Gold.		Silver.	
	Ounces, fine.	Value.	Ounces, fine.	Coining value.
Domestic bullion	38, 162. 627	$788, 891. 50	8, 512. 60	$11, 006. 19
United States coin	2, 137. 549	44, 187. 06	....	....
Jewelry, etc	3, 534. 858	73, 072. 01	34, 083. 83	44, 067. 98
Total	43, 835. 034	906, 150. 57	42, 596. 43	55, 074. 17

To determine as nearly as possible the amounts of gold and silver furnished by private refineries for use in the industrial arts during the calendar year 1894, a circular letter of inquiry was addressed to 49 firms, believed to comprise all engaged in such manufacture. Replies were received from 46 of the firms addressed, 15 reporting that no such bars were manufactured by them during the year.

In the following table will be found the amounts and value of gold and silver furnished for industrial purposes by the 31 firms manufacturing:

BARS FOR INDUSTRIAL USE FURNISHED GOLDSMITHS AND OTHERS BY PRIVATE REFINERIES DURING THE CALENDAR YEAR 1894.

Material used.	Gold bars manufactured.		Silver bars manufactured.	
	Ounces, fine.	Value.	Ounces, fine.	Coining value.
Domestic bullion (exclusive of United States bars)	42,420	$876,904	1,847,799	$2,389,073
United States bars	24,903	514,792	998,223	1,290,632
United States coin	17,027	351,980		
Old plate, jewelry, and other old material	38,073	787,051	476,182	615,670
Total	122,423	2,530,727	3,322,204	4,295,375

It will be seen that the value of United States bars—bars bearing the stamp of a United States mint or assay office—was, gold, $514,792; silver, $1,290,632.

These bars are manufactured by Government institutions and are included in the preceding tables giving the amounts furnished by the Philadelphia Mint and New York Assay Office, and must, in order to avoid duplication, be eliminated from the amounts reported by private refineries.

The following table exhibits the weight and value of gold and silver bars, exclusive of United States bars, furnished by private refineries for industrial purposes during the year:

BARS FOR INDUSTRIAL USE (EXCLUSIVE OF GOVERNMENT BARS) FURNISHED GOLDSMITHS AND OTHERS BY PRIVATE REFINERIES DURING THE CALENDAR YEAR 1894.

Material used.	Gold bars manufactured.		Silver bars manufactured.	
	Ounces, fine.	Value.	Ounces, fine.	Coining value.
Domestic bullion	42,420	$876,904	1,847,799	$2,389,073
United States coin	17,027	351,980		
Old plate, jewelry, and other old material	38,073	787,051	476,182	615,670
Total	97,520	2,015,935	2,323,981	3,004,743

The following summary shows the value of the gold and silver bars for industrial purposes furnished by Government and private refineries during the calendar year 1894:

GOLD AND SILVER BARS FURNISHED FOR USE IN MANUFACTURES AND THE ARTS DURING THE CALENDAR YEAR 1894, AND CLASSIFICATION OF THE MATERIAL USED.

Material used.	Gold.	Silver (coining value).	Total.
Domestic bullion	$6,430,073	$8,579,472	$15,009,545
United States coin	396,167	....	396,167
Foreign bullion and coin	543,585	982,399	1,525,984
Old material	2,184,946	1,221,177	3,406,123
Total	9,554,771	10,783,048	20,337,819

For the purpose of comparison, the following table, exhibiting the value of gold and silver furnished for industrial uses by Government institutions and private refineries during the calendar year 1893, is given:

GOLD AND SILVER BARS FURNISHED FOR USE IN MANUFACTURES AND THE ARTS DURING THE CALENDAR YEAR 1893, AND CLASSIFICATION OF THE MATERIAL USED.

Material used.	Gold.	Silver (coining value).	Total.
Domestic bullion	$8,354,482	$6,570,737	$14,925,219
United States coin	587,622	....	587,622
Foreign bullion and coin	804,254	1,740,704	2,544,958
Old material	2,777,165	1,222,836	4,000,001
Total	12,523,523	9,534,277	22,057,800

A comparison of the values of the precious metals used in the industrial arts in the United States during the calendar years 1893 and 1894 shows a decrease during the last year in gold of $2,968,752, while the value of silver thus employed has increased $1,248,771.

Government institutions and private refineries report that during the calendar year 1894 there were $396,167 in United States gold coin consumed in the manufacture of bars for industrial purposes.

There are no returns showing the actual amount of United States gold and silver coins melted down by goldsmiths and jewelers, as the amount thus consumed would not appear in the reports of institutions manufacturing bars.

On pages 45 and 46 of the Report on the Production of Precious Metals for the year 1893 are set forth the reasons for the reduction of former estimates of this Bureau of the amount of domestic coin used annually by this class of manufacturers.

Assuming the total amount of United States gold coin used in the arts to be $1,500,000 and silver coin $100,000, the industrial consumption of the precious metals in the United States during the calendar year 1894 would be as follows:

INDUSTRIAL CONSUMPTION OF THE PRECIOUS METALS DURING THE CALENDAR YEAR 1894.

Material used.	Gold.	Silver (coining value).	Total.
Domestic bullion	$6, 430, 073	$8, 579, 472	$15, 009, 545
United States coin	1, 500, 000	100, 000	1, 600, 000
Foreign bullion and coin	543, 585	982, 399	1, 525, 984
Old material	2, 184, 946	1, 221, 177	3, 406, 123
Total	10, 658, 604	10, 883, 048	21, 541, 652

In the above summary of gold and silver bars furnished for use in manufactures and the arts during the calendar year 1894 are included the gold bars exchanged for gold coin at Government institutions, the value of which is shown in the following table:

GOLD BARS EXCHANGED FOR GOLD COIN.

Month.	Philadelphia.	New York.	Total.
January	$55, 226. 97	$187, 518. 40	$242, 745. 37
February	55, 226. 18	296, 244. 07	351, 470. 25
March	65, 286. 98	289, 336. 35	354, 623. 33
April	70, 305. 63	316, 742. 21	387, 047. 84
May	60, 320. 38	294, 908. 76	355, 229. 14
June	70, 442. 14	226, 130. 82	296, 572. 96
July	45, 308. 03	218, 549. 10	263, 857. 13
August	65, 228. 13	299, 818. 34	365, 046. 47
September	75, 313. 16	506, 080. 88	581, 394. 04
October	85, 414. 86	641, 491. 32	726, 906. 18
November	90, 490. 49	591, 464. 86	681, 955. 35
December	50, 328. 55	381, 934. 98	432, 263. 53
Total	788, 891. 50	4, 250, 220. 09	5, 039, 111. 59

THE WORLD'S INDUSTRIAL CONSUMPTION OF GOLD AND SILVER IN 1894.

In 1893 for the first time interrogatories relating to the industrial consumption of gold and silver were included in the list of questions sent in this Bureau's annual circular of inquiries addressed, through our representatives abroad, to the Governments to which they were accredited.

The only answers received, up to the time that the last report of this series was sent to press, to that interrogatory, conveying any definite information, were from France, Sweden, and the Netherlands.

Taking the industrial consumption in the United States in 1893, that of France, Sweden, and the Netherlands, as reported to this Bureau for 1893, those of Mr. Ottomar Haupt for 1890, 1891, and 1892, and those of Dr. Soetbeer for 1885, we have the following table of the net industrial consumption of gold in the world as nearly as the same could be estimated in 1893:

Country.	Year.	Authority.	Net consumption.
			Kilograms.
United States	1893	Mint Bureau	15, 736
France	1893	do	12, 000
Sweden	1893	do	120
Netherlands	1893	do	330
England	1890	Haupt	17, 000
Germany	1890	do	15, 000
Switzerland	1890	do	6, 000
Belgium	1885	Soetbeer	2, 070
Austria-Hungary	1885	do	2, 400
Russia	1885	do	2, 400
Other civilized countries	1885	do	2, 400
Total			75, 456

This estimate would give the gold industrial consumption of the world, in 1893, in round numbers, at 75,500 kilograms, of the value of $50,177,300.

In the above calculation $2,777,165 old material and $200,000 foreign gold coin, representing 4,480 kilograms, were deducted from the gross industrial consumption of gold in the United States to get the net amount, while the amount reported from France, the Netherlands, and Sweden was, with a like view, reduced 20 per cent.

Estimating the net industrial consumption of silver in the same way gave the following table:

Country.	Year.	Authority.	Net consumption.
			Kilograms.
United States	1893	Mint Bureau	184, 570
France	1893	do	120, 000
Sweden	1893	do	2, 000
Netherlands	1893	do	6, 618
England	1890	Haupt	80, 000
Germany	1890	do	100, 000
Switzerland	1892	do	50, 000
Belgium	1885	Soetbeer	17, 400
Austria-Hungary	1892	Haupt	30, 000
Russia	1885	Soetbeer	32, 000
Other countries	1885	do	40, 000
Total			662, 588

The industrial consumption of silver in the world in 1893 was therefore taken, in round numbers, to have been 663,000 kilograms, of the coining value of $27,554,280, and the commercial value, at the commercial price of silver during the year ($0.78), of $16,622,980.

In the above table of the world's net industrial consumption of silver in 1893, $1,963,540, representing 47,246 kilograms, were deducted from the gross consumption of the metal in the United States for foreign coin and old material embraced in the gross consumption. A reduction of 25 per cent was made in the items reported to this Bureau from France, Sweden, and the Netherlands.

This Bureau published these figures as an approximate, provisional estimate of the industrial consumption of gold and silver in civilized countries in 1893. As will be seen, they were based on the latest figures obtainable in the case of each country from trustworthy sources.

Modifying the data in the above tables in accordance with information received since their publication from France, Sweden, the Netherlands, Switzerland, Portugal, and Austria, inserting in them the net industrial consumption of gold and silver in the United States in 1894, and making similar deductions as in 1893 for old material employed in the industrial consumption of the other above-named countries, gives for 1894 a world's industrial consumption of gold of 78,519 kilograms, valued at $52,183,736, as shown in the following table:

Country.	Year.	Authority.	Weight.	Value.
			Kilograms.	
United States	1894	Official	12,750	$8,473,658
France	1894	....do	14,400	9,570,240
Sweden	1894	....do	272	180,771
Netherlands	1894	....do	336	223,306
Switzerland	1894	....do	7,000	4,652,200
Russia	1893	....do	5,331	3,542,983
Portugal	1893	....do	1,960	1,302,616
England	1890	Haupt	17,000	11,298,200
Germany	1885	Soetbeer	15,000	9,969,000
Belgium	1885	....do	2,070	1,375,722
Other countries	1885	....do	2,400	1,595,040
Total			78,519	52,183,736

Dr. Samuel McCune Lindsay, in his able work, *Die Preisbewegung der Edelmetalle seit 1850*, Jena, 1893, estimates that the production of gold as computed by Dr. Soetbeer for certain countries in 1885 had increased in 1890 10 per cent, i. e., at the rate of 2 per cent a year. This does not seem improbable.

In view of the increased production of gold in recent years, and of the universally conceded fact that the industrial consumption of gold is also increasing, it would seem that some addition should be made to the figures of Ottomar Haupt for 1890 and of Dr. Soetbeer for 1885, in order to approximate to the industrial gold consumption of England, Germany, Belgium, and other civilized countries given above, and to form a reasonable estimate of the industrial consumption of gold in 1894. We have, however, no data to guide us in determining how large the addition should be, and must be satisfied with the declaration that the sum of the items published above falls below the actual consumption of gold for industrial purposes in 1894.

The Bureau hopes that, in a few years at least, all the countries named in the above table will collect data sufficient to allow the compilation of an approximately correct estimate of their industrial gold consumption. It will continue to publish the information bearing on this important subject until such time as it shall have collected enough to warrant a serious endeavor to calculate the amount of newly produced gold which enters annually into the world's industrial employment of that metal.

A modification of the table of the industrial consumption of silver in 1893 similar to that of the industrial consumption of gold, by inserting in it data received since it was published, gives the following estimate of the employment of silver in the arts in 1894:

Country.	Year.	Authority.	Weight.	Value.
			Kilograms.	
United States	1894	Official	232, 480	$9, 661, 871
France	1894	.....do	131, 250	5, 454, 750
Sweden	1894	.....do	2. 500	103, 900
Netherlands	1894	.....do	5, 600	232, 736
Switzerland	1894	.....do	55, 000	2, 285, 800
Austria	1894	.....do	40, 000	1, 662, 400
Russia	1893	.....do	75, 000	3, 117, 000
Portugal	1893	.....do	23, 000	955, 880
England	1890	Haupt	80, 000	3, 324, 800
Germany	1890	.....do	100, 000	4, 156, 000
Belgium	1885	Soetbeer	17, 400	723, 144
Other countries	1885	.....do	40, 000	1, 662, 400
Total			802, 230	33, 340, 681

These figures must, as in the case of those of the industrial consumption of gold and for analogous reasons, be considered as too low.

THE WORLD'S PRODUCTION OF GOLD AND SILVER IN 1894.

The world's production of gold in 1894 was 270,787 kilograms, or 8,705,836 ounces, fine, of the value of $179,965,600, against 236,676 kilograms, or 7,609,242 ounces, fine, of the value of $157,297,000, in 1893, an increase in weight of 34,111 kilograms, or 1,096,594 ounces, fine, of the value of $22,668,600.

The world's output of silver in 1894 was, approximately, 5,182,976 kilograms, or 166,601,995 ounces, fine, of the commercial value (at the average price of silver during the year) of $105,757,300 and the coining value of $215,404,600, as compared with the silver product of 1893 of 5,138,298 kilograms, or 165,165,876 ounces, fine, of the commercial value (at the average price of silver during the year) of $128,829,383 and the coining value of $213,547,800, showing an increase in the product of 1894 over 1893 in the coining value of $1,856,800.

The countries whose gold product shows an increase in 1894 over 1893 are—

United States	$3,545,000
Australasia	6,072,200
Mexico	3,194,700
Sweden	500
Greece	1,000
Great Britain	23,500
Dominion of Canada	114,900
Ecuador	16,400
Venezuela	45,500
Guiana (French)	331,000
Peru	1,400
Central American States	307,000
China	1,663,900
Japan	5,800
Africa	11,327,500
India (British)	173,300
Total	26,823,600

The countries whose gold product in 1894 shows a decrease as compared with that of 1893 are—

Russia	$3,674,800
Argentine Republic	45,200
Guiana (British)	257,300
Guiana (Dutch)	57,000
Korea	120,700
Total	4,155,000

The countries whose silver product shows an increase in 1894 over 1893 are—

Mexico	$3,459,700
Norway	8,700
Spain	40,400
Greece	1,388,500
Great Britain	2,000
Dominion of Canada	774,600
Argentine Republic	636,200
Bolivia	10,819,900
Peru	2,012,100
Japan	120,100
Total	19,262,200

The countries whose output of silver in 1894 shows a decrease as compared with 1893 are—

United States	$13, 575, 700
Australasia	3, 139, 300
Russia	63, 900
Sweden	66, 600
Turkey	200, 200
Chile	359, 700
Total	17, 405, 400

The following table shows the production of the precious metals in the world for the calendar years 1873 to 1894:

PRODUCTION OF GOLD AND SILVER IN THE WORLD FOR THE CALENDAR YEARS 1873–1894.

Year.	Gold.		Silver.		
	Ounces, fine.	Value.	Ounces, fine.	Commercial value	Coining value.
1873	4, 653, 675	$96, 200, 000	63, 267, 187	$82, 120, 800	$81, 800, 000
1874	4, 390, 031	90, 750, 000	55, 300, 781	70, 674, 400	71, 500. 000
1875	4, 716, 563	97, 500, 000	62, 261, 719	77, 578, 100	80, 500, 000
1876	5, 016, 488	103, 700, 000	67, 753, 125	78, 322, 600	87, 600, 000
1877	5, 512, 196	113, 947, 200	62, 679, 916	75, 278, 600	81, 040, 700
1878	5, 761. 114	119, 092, 800	73, 385, 451	84, 540, 000	94, 882, 200
1879	5, 262, 174	108, 778, 800	74, 383, 495	83, 532, 700	96. 172. 600
1880	5, 148, 880	106, 436, 800	74, 795, 273	85, 640, 600	96, 705, 000
1881	4, 983, 742	103, 023, 100	79, 020, 872	89, 925, 700	102, 168. 400
1882	4, 934, 086	101, 996, 600	86, 472, 091	98, 232, 300	111, 802, 300
1883	4, 614, 588	95, 392, 000	89, 175, 023	98, 984, 300	115, 297, 000
1884	4, 921, 169	101. 729, 600	81, 567, 801	90, 785, 000	105, 461, 400
1885	5, 245, 572	108, 435, 600	91, 609, 959	97, 518, 800	118, 445, 200
1886	5, 135, 679	106, 163, 900	93, 297, 290	92, 793, 500	120, 626, 800
1887	5, 116, 861	105, 774, 900	96, 123, 586	94, 031, 000	124, 281, 000
1888	5, 330, 775	110, 196, 900	108, 827, 606	102, 185, 900	140, 706, 400
1889	5, 973, 790	123, 489, 200	120, 213, 611	112, 414, 100	155, 427, 700
1890	5, 749, 306	118, 848, 700	126, 095, 062	131, 937, 000	163, 032, 000
1891	6, 320, 194	130, 650, 000	137, 170, 919	135, 500, 200	177, 352, 300
1892	7, 102, 180	146, 815, 100	153, 151, 762	133. 404, 400	198, 014, 400
1893	7, 609, 242	157, 297, 000	165, 165, 876	128. 880, 600	213, 547, 800
1894	8, 705, 836	179, 965, 600	166, 601, 995	105, 757, 300	215, 404, 600
Total	122, 204, 141	2, 526, 183, 800	2, 128, 320, 400	2, 150, 037, 900	2, 751, 767, 800

Referring to the world's production of gold in 1893, the last report of this series, page 57 et seq., says:

> The United States in 1893 shared to the extent of 23.11 per cent in the total gold production of the world. The world's output of gold in 1893 was the largest in history, amounting, as it did, to 234,006 kilograms, of the value, in round numbers, of $155,522,000.
>
> The highest previous yield of gold was in the period 1856–1860, when the production reached an average weight per annum, according to Dr. Soetbeer, of 201,750 kilograms, fine, and an average yearly value of 562,900,000 marks, or $133,970,000.
>
> The output of gold, therefore, in 1893 was 16.08 per cent greater than the annual average of the period of the greatest productiveness of the Californian and Australian gold mines.

A still more notable fact, and one which will be a matter of surprise to the world of finance—as attention is now for the first time called to it—is, that the value of the gold product of the world in 1893 was only 8.77 per cent less than the average aggregate value of the gold and silver product of the world in 1861–1865. Dr. Soetbeer estimates the value of the average total output of gold and silver in the world in 1861–1865 at 715,634,000 marks, or $170,473,383. The value of the world's production of gold in 1893 alone was, as remarked above, in round numbers, $155,522,000, or ($1 = 4.1979222 marks) 652,869,000 marks, a difference of 62,765,000 marks, or $14,951,400. In other words, the value of the yield of the gold mines of the world in 1893 was only $14,951,400 less than the value of the average yield of both the gold and silver mines of the world in 1861–1865.

The average value of both the gold and silver product of the world for the period of eight years, 1866–1873, which just preceded the beginning of the depreciation of silver, was 801,093,000 marks, or $190,831,000, a difference between the value of the average total of the gold and silver production of these years and that of the gold product of 1893 alone, of only $35,309,000. If the production of gold in 1894 exceeds that of 1893 by 22.7+ per cent, it will reach in value the world's production of both metals ($190,831,000) twenty years ago. This is a most momentous fact, and one which must have much influence on the monetary policy of all civilized states in the future.

The great probability is that the value of the world's output of gold in 1894 will equal that of both metals in the years 1861–1865, and in 1895 or 1896, that of the years immediately preceding the beginning of the depreciation of silver, i. e., the average of 1866–1873, inclusive. It may be predicted with certainty that it will be greater in 1897 than such average.

Of the $14,951,400 of gold needed to bring the value of the yield of the gold mines of the world in 1894 up to that of the world's average output of both gold and silver in 1861–1865, it is even now demonstrable that South Africa alone will furnish at least $8,574,085, leaving an excess of only $7,361,915 to be supplied by other countries.

The production of the Witwatersrandt during the first four months of 1894 was:

	Ounces.
January	149, 814
February	151, 870
March	165, 372
April	168, 745
Total	635, 801

The total of the Witwatersrandt for the whole year will, in all probability, be three times this amount, i. e., over 1,907,403 ounces.

If 200,000 ounces for the rest of South Africa be added to the above sum, the total gold output of the Transvaal in 1894 would amount to 2,107,403 ounces, of the value of $36,920,436, an increase over the value of the gold product of South Africa in 1893 of $8,626,605, or of 30.49 per cent.

Should the gold product of the other countries of the world increase in 1894 over that of 1893 in the same ratio as that of 1893 did over that of 1892, viz, by $4,150,300, or 3.288 per cent, the production of the world in 1894 would amount to $168,299,000.

Again, should South Africa's product in 1895 increase in only the same proportion over its estimated output for 1894, viz, 30.49 per cent, or $11,257,041 (the yield of the west coast continuing stationary at that of 1892, $1,011,924), and the product of the rest of the world in the same ratio as in 1893, the total gold production of the world would in 1895 increase over that of 1894 by $15,543,500 and reach the figure of $183,842,000, leaving a difference in the value of the estimated production of gold a year and a half hence and the value of the production of both gold and silver in 1866–1873 of a little less than $7,000,000.

From what has been said, it is plain that in 1894 the value of the output of gold alone will very nearly equal that of the yield of the world's mines of both gold and silver in 1861–1865, and, a little later, that of the total production of both metals before the demonetization or depreciation of silver. Value, not weight, is the thing to be chiefly considered in the production of gold and silver, viewed from a monetary point of view.

The results reached above will be made clearer from the following tabular view:

Average value of the world's output of gold and silver, 1861–1865	$170,473,383
Average value of the world's output of gold and silver, 1866–1873	190,831,000
Value of the world's output of gold alone, 1893	155,522,000
Estimated minimum value of the world's output of gold alone, 1894	168,299,000
Estimated minimum value of the world's output of gold alone, 1895	183,842,000

Predictions as to the future production of the precious metals are always hazardous; but, so far as any predictions capable of fulfillment in 1894 are contained in the above extract from the report on the production of the precious metals in 1893, they have been verified by the history of the production of gold in 1894. The value of the world's output of gold in the latter year not only equaled the annual average of both gold and silver in the period 1861–1865, but exceeded it by $11,204,600, while the world's yield of gold alone in 1894 was greater than that of the average of the years 1856–1860, in which the productiveness of the Australian and Californian gold fields was at its highest, by $45,882,600, or more than 34 per cent. The "great probability" that the value of the world's output of gold in 1895 or 1896 would equal that of both metals in the years immediately preceding the beginning of the depreciation of silver has been changed into a certainty by the events of 1894, since the average annual yield of gold and silver of all countries in 1866–1873 exceeds that of gold alone in 1894 by less than $11,000,000.

While, however, in 1893 the United States ranked first as a gold-producing country, in 1894 it ranked probably only third, its output of $39,500,000 having been exceeded in the latter year by that of Australasia ($41,760,800) and that of Africa ($40,271,000). But while the production of gold by the United States in 1894 was relatively less than in 1893, it shows an absolute increase of $3,545,000 in 1894 over the product of 1893.

There has, with the exception of the year 1890, been a steady increase in the world's annual production of gold since 1887, when the yield of the Witwatersrandt mines began to figure to any noteworthy extent in the total yield of the metal, so that there is the best of reasons for claiming that the discovery of the conglomerate beds of that region marks the beginning of as well-defined and important a period in the history of the production of gold as does the discovery of the gold deposits of California and Australia. It is an error, however, to assume that the recent increase of the world's output of gold is due exclusively to the South African mines.

The average annual gold product of the world in the fourteen years 1873–1886, inclusive, was $103,796,200.

The gold production of the world, exclusive of South Africa, in the years 1887 to 1894, inclusive, is shown in the following table:

Year.	World's gold product.	Product of South Africa.	World's gold product, less product of South Africa.
1887	$105,774,900	$1,919,600	$103,855,300
1888	110,196,900	4,500,000	105,696,900
1889	123,489,200	7,788,372	115,700,828
1890	118,848,700	10,438,356	108,410,344
1891	130,650,000	14,885,639	115,764,361
1892	146,815,100	23,220,108	123,594,992
1893	157,297,000	28,293,831	129,003,169
1894	179,965,600	39,696,330	140,269,270

It thus appears that if the Witwatersrandt mines had never been discovered the world's production of gold since 1887, would, everything considered, have been an ever-increasing one. The annual average output of the gold mines of the world in the eight years beginning with 1887 was $134,129,675, or $30,333,475 more than the annual average of the fourteen preceding years, which embrace nearly five years anterior to the publication of Professor Suess's celebrated theory, and nearly the nine years immediately following it.

The only reasonable doubt as to the correctness of the figures of the would's output of gold in this report relates to the production of gold in the South African Republic. Reference to this will again be made in the proper place. In the last report of this series, page 150, it was observed:

"In statistical calculations the value of an ounce of Transvaal gold is taken at 70 shillings. Our own data are based on that valuation.

"This is the lowest rate at which Transvaal gold, which has an average fineness of .880 and a value of 75s. 6d. per ounce, is sold.

"But in the valuation of 70 shillings, deduction has been made in advance of all the costs connected with the exportation of the gold to Europe—freight, insurance, etc. The South African valuation will be higher in 1893. The steamship companies have materially reduced the rates of freight, and the Transvaal has erected a mint of its own, and has been stamping, since the beginning of 1893, gold coins of the same fineness as the English. As soon as the negotiations with the English colonies and the Orange Free State result in the monetary convention desired by the Transvaal, the importation of coined gold into South Africa will gradually cease and the coarse gold bring a higher price." (Heim, p. 46.)

The value assigned to the South African gold varies very much. It is put in some publications at $17.03, in others at $18, and in still others as high as $19 per ounce. As already stated, the value assigned by this Bureau, in past reports on the production of gold in South Africa, was $17 per ounce. It was not without misgivings that this value was used in the computations of this Bureau. To settle the matter, the Director of the Mint, believing that a large amount of the gold from the mines of the South African Republic went to the Royal Mint at London to be assayed and coined, addressed the following cablegram to Sir C. W. Fremantle, deputy master of that institution: "Please cable average fineness of South African gold." Mr. Fremantle answered, with his usual promptness and courtesy, "847 decimal 5." This corresponds to a value of $17.5194, or £3 12s., and in this report the production of gold from the mines of the Transvaal for the years 1889–1893 has been calculated in accordance with this fineness and value. The weights published by the Johannesburg Chamber of Mines and by the Transvaal Government do not represent absolutely pure metal, for the bars when the miners sell them still contain a certain quantity of foreign matter. Before being delivered to the mints or manufacturers of jewelry, etc., they have to be refined, and hence are sold at only 70 shillings per ounce. Their real value, however, is £3 12s., and their real fineness not .823, but .847½.

The actual value of Transvaal gold, as given in its statistics is still a matter of doubt. It is estimated in this report as in the last, but the value here given it is considered only approximately correct.

WORLD'S COINAGE.

In the Appendix will be found a table, revised from the latest information received, exhibiting the coinages of the various countries of the world during the calendar years 1892, 1893, and 1894.

The following is a summary of the same:

Calendar year.	Gold.	Silver.
1892	$172,473,124	$155,517,347
1893	232,485,668	135,389,753
1894	225,605,551	106,945,740

The above figures represent, as nearly as this Bureau has been able to ascertain, the total value of the gold and silver coinages executed in the world during the years therein named.

It must be borne in mind, however, that the total of these coinages does not correctly represent the amount of new gold and new silver made into coins during the year, for the reason that the coinages as reported include the value of domestic and foreign coins melted for recoinage, as well as old material, plate, etc., used in coinage.

In the circular letter of inquiry prepared at this Bureau and sent to foreign Governments through the Department of State asking for information on these subjects it was especially requested that each country report the amount of such recoinages. This has been done in many instances, but not in all.

THE FUTURE OF GOLD BEFORE THE GERMAN SILVER COMMISSION.[1]

The production of gold has increased from year to year since 1887, and in 1894 reached an amount which would have been considered incredible a few years ago. But will this production of gold continue to maintain the level it has now reached for any length of time, or even rise higher; and, on the other hand, will the production of silver, which in 1893 began to decline as compared with 1892, ultimately find a limit in the declining price of the metal?

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[1] Compare Die Deutsche Silberkommission, by Prof. W. Lexis, in Hildebrand's Jahrbücher.

Bimetallists at the German Silver Commission of 1894 were inclined to take the negative side on the former question and the affirmative on the latter. They hoped that they would find their views confirmed, if they could induce the Government to call Prof. Edward Suess, whose opinions are well known from his published writings, to the witness stand. The Government acceded to this wish, and at the instance of the opposing party Professor Stelzner, of Freïberg, and Professor Schmeisser were also invited to give evidence. Besides the latter, there were among the Government commissioners geological and metallurgical experts, such as Hauchecorne, Professor Zirkel, the Würtemberg mint assayer, Dr. Klüpfel, and Herr Leuschner. Suess defended the view that the production of gold would increase during the next decennial period, chiefly by the exploitation of Africa, but contended that when this new wave of gold production had passed no new Africa would be found. Gold mines in old, civilized countries had, he claimed, long since been exhausted, while Brazil and the eastern part of the United States had yielded up their gold stores as far back as the middle of the last century.

But the faster one lives the more rapidly he consumes his capital. And so it is in gold mining. The more rapidly the existing mines are exploited the more rapidly will the production of gold cease and the time come when, according to Professor Suess, there will be no talk of the gold standard. Suess could not say when this time would come, but he believed that its advent had been hastened by events of comparatively recent occurrence in the mining of gold.

He expressed himself rather skeptically with respect to the Transvaal, and disagreed on many points with Bergrat Schmeisser and with the views the latter has expressed in his report on the Transvaal mines. Professor Suess laid special stress on this, that the auriferous conglomerate strata of the Witwatersrandt—which he considered to be fossil alluvial beds—probably did not have the regular and uniform propagation of coal beds. Hence he thought that estimates of the gold contents in accordance with the external expansion of the trough and the average contents of the layers in the mines worked were of doubtful accuracy. It was also uncertain whether the auriferous strata could be worked as Schmeisser assumed at depths of more than 800 meters, still less of 1,200 meters, with profit.

Thus far there was only one shaft which reached a depth of 2,343 feet. Suess also admitted that there was still a large reserve of gold in California, which might be obtained by the hydraulic process. The most important step in advance, however, was that means had been found to work not only the auriferous sulphides found at great depths, but also the finest slimes and tailings. If no more could be done with the sulphides now than could have been done with them seventeen years ago, when Suess's book, The Future of Gold, appeared, the Witwatersrandt would not show the production that it does, since it would have been impossible to go below the top. Here, too, is a gold reserve, which has now been attacked.

As to silver, Suess claimed that the extraordinary increase of this production in the United States during the last eight or nine years was caused by the fact that the silver ores proper, occurring in lodes, the so-called dry ores, are no longer worked, as formerly, by amalgamation, but all are smelted by melting them with a flux of easily liquefiable lead ore, especially of white-lead ore. The deposits of these fluxing ores in Colorado are now for the most part exhausted, and the importation of Mexican ores is hampered by the high duty.

As an enormous decline in the price of silver has taken place the production of silver in the United States has also declined, and a great many mines are still kept in operation simply in order to prevent them from eating up their capital and in the hope of an improvement in the price, but no more new mines are opened up.

Suess had said two years before in his work, The Future of Silver, that the price at that time (about 40 pence) was not yet low enough to force a large curtailment of the production of silver, but now, with a price of less than 30 pence, the plumb line, at least in the United States, had reached the bottom. There might be individual mines in which silver might be produced at a cost of 30 pence, but the great mass of the mines could no longer be operated with a profit at the present price.

Suess also claimed that the production of silver in Australia was declining. At all events it had been demonstrated that the Broken Hill mines did not maintain their richness in the depth. The production did not decline in Mexico, which was to be attributed to the fact that the silver standard exists in Mexico, and that the existence of that standard there caused wages in Mexico, measured in gold, to be much lower than in the United States.

The rise in the price of silver would indeed cause a renewed increase of the production of silver, especially in Mexico and Peru. Suess declared that he was not in favor of the ratio of 1 to 15½, and had never been in favor of it. He would be satisfied with a mean ratio of value between the former one and the present commercial ratio—that is, about 1 to 23½. Soetbeer had recommended it at 1 to 22.

Messrs. Leuschner and Zirkel shared the views expressed by Professor Suess. Mr. Schmeisser spoke in defense of the estimates he had made of the future gold output of the Witwatersrandt district. These estimates were to the effect that the gold stores of that district to a depth of 800 meters represented a value of 4,289,000,000 marks, or $1,020,782,000; and if it were assumed that the past annual average increase of the production would last ten years, and that the yield would then remain constant, the exhaustion of these deposits might be expected to take place in twenty-five years. On the assumption of a depth of 1,200 meters the gold stores of the Witwatersrandt would amount to 7,187,000,000 marks, or $1,710,506,000, and would last forty years. On the productive capacity and the permanence of other mining districts of the Transvaal—that is, of the DeKaap, Lydenburg, Klein Letaba, and other gold fields—as well as of the South African region in the north of the Transvaal, no accurate data could be given.

Professor Stelzner in a lengthy discussion expressed the view that the production of both gold and silver was still capable of great development. He contended that "surprises" were still possible, surprises such as had been met with in Colorado, Australasia, Nevada, and the Transvaal. Besides, further technic advances might be calculated on, processes similar to that of the cyanide process, discovered in 1890, by means of which the gold in auriferous pyrites might be almost entirely extracted. Large tracts of country, as, for instance, the interior of Brazil, had been explored either superficially or not at all, and might, therefore, contain important deposits of the precious metals.

The exploitation of the silver mines of Peru and Bolivia had only just begun to be carried on with sufficient capital. Until a short time ago all ores and all the water had to be carried from the mines on the backs of the workmen in leather bags. Now, there is a railway running up to Antofagasta, in the Andes, at an elevation of 400 meters, and will soon reach La Paz. Vessels sail on Lake Titicaca, and a second railway, starting from Puno, and crossing the Arequipa, extends to the Pacific Ocean.

Professor Stelzner remarked that he spoke as a geologist and miner, without any reference to the question of the standard.

Mining Expert Dr. Klüpfel called attention to the decline of the cost of the production of silver, caused, among other things, by the introduction of the reverbatory-furnace process, as well as by silver separation by zinc. There was also the cheapening of the cost of transportation, which had much more effect on silver than on gold. Gold was, for the most part, marketable at the place of production, while silver-smelting establishments were usually not in the vicinity of the mines, but in large cities, far from the place of production. By the development of the network of railroads the cost of transportation in the United States had been largely diminished in the last ten years. If the price of silver, although low as compared with that of gold, could be only rendered stable to some extent a great increase of the production of that metal might be expected, because this production is now kept back by the uncertainty of the market.

Mining Expert Hanchecorne was also of the opinion that an increase of the price of silver would cause an increase of its production. Although the deposits of carbonate of lead in the United States are almost exhausted, a series of new deposits of the same kind have recently been discovered. A great part of Montana, which has contributed so much to the increase of the production of silver, has not been sufficiently examined from a mining point of view, and even in the parts which have been worked mining operations are not carried on with all the technical ability required.

In the United States in 1891 40 per cent of the total output of silver was obtained, it is said, from lead ores, 10 per cent from copper ores, and 50 per cent from silver ores proper.

The cost of production in 1889 of 155 mines, which yielded 43 per cent of the total product, amounted to about 26 pence, exclusive of interest on capital, and in 1890 the cost of production of about 32½ per cent of the total product amounted to about 25 pence. It may be assumed that Herr Hauchecorne thought that in 1892 about one-half of the silver produced was obtained at an average cost of 65 cents (about 32½ pence, according to London prices), and the other half at a cost of about 90 cents. If this be so a part of the works must have been operated at a loss.

In the light of all the material laid before the commission, says Professor Lexis, it can not be denied that at present there is less reason than ever to raise the cry of a scarcity of gold. According to a report of the Director of the Mint for 1894, the total gold production of the world amounted to $179,965,600. South Africa alone produced $39,696,330, $11,402,499 more than in 1893. Western Australia, which in 1892 produced 59,600 ounces, in 1893 produced 110,890 ounces and in 1894, 207,131 ounces. The gold field of Coolgardie is the most important of Western Australia. A quartz lode is there worked which yields from 8 to 10 ounces of gold per ton. Alluvial gold deposits are also found in the colony and are at present exceedingly rich. The serious drawback of West Australian mining is the lack of water, but the prospects of gain are so great that there is no doubt sufficient capital will be found to overcome this drawback. Besides, the colonial government has taken measures to bring water to the mines. The effect of hydraulic mining in California in the future is also of great importance to the future production of gold.

It may be expected, says Professor Lexis, that in the next succeeding years, a further increase of the production of gold will take place, both because South Africa, Australasia, and Colorado have not yet reached their maximum production, and also because the better turning to account of the auriferous pyrites by the cyanide or some other process will doubtless increase the output in the United States and Australasia. It is therefore probable that, beginning with 1895, the production of gold will reach $200,000,000. But, on the other hand, Professor Suess is perfectly right in saying that the production of gold can not always remain at that figure, and that ultimately the time must come in which the world's yield of gold will permanently retrograde, and that that time will come all the sooner the more intensive the exploitation of the beds opened is carried on.

There may, indeed, yet be discovered large and productive regions in the interior of Africa, in Brazil, and in Australasia, but with every new discovery of this kind the probability of a further discovery will be diminished, while, on the other hand, every gold field now worked will be exhausted after a comparatively short time. Even the gold stores of the Witwatersrandt can, according to the most favorable estimates, last only about forty years.

Professor Suess, however, thinks that the turning point for the definite decrease of the production of gold may be placed at half a century from the present time. But the decrease of the production is by no means synonymous with its cessation, and it is quite possible that a century may elapse before the production of gold shall have sunk to the figures of the production of the eighties.

There is nothing, Professor Lexis claims, to prove that, even in the distant future, it will be less than the needs of the civilized world, especially as then the existing stock will have been enormously increased. The production of silver in the United States has indeed declined since 1892, but the decline in the United States has been more that offset by the increased production in Mexico, whose output increased from 1,228,994 kilograms in 1892 to 1,380,116 kilograms in 1893 and to 1,463,361 kilograms in 1894.

Dr. Arendt called attention to the fact that in Mexico the production of silver is only slightly influenced by the price of silver, because the greater part of the production of silver there is paid for in silver. Dr. Arendt is right to a certain extent in this contention, and on that very account, even at the present low price of the metal, a slight advance in the Mexican production of silver may be expected, especially as the wealth of that country in silver ores with moderate silver contents is almost inexhaustible. Capitalists would then go to Mexico to develop its mines, both by the construction of railways and by the introduction of technic improvements, thus concentrating the operations of the mines.

European companies have begun to work some of the silver mines of Bolivia with more or less success, and a rise in the price of silver would undoubtedly attract much capital there. The production of silver in Australia has also largely increased. A large part of this increase is due to the mine of the Broken Hill Proprietary Mining Company.

That, however, a great rise in the price of silver, especially a rise to its former height, would cause a great increase of production, one greater than the production of 1893, can not be questioned if one weighs the facts calmly and without prejudice.

This was made apparent to the commission by the interesting report of Mining Inspector Wimmer, of Eisleben, laid before it by the bimetallists. Wimmer says that the masses of ore which have intruded themselves in the form of beds of great extent between the strata of the paleozoic formations, although usually in the form of poor ores, contain almost inexhaustible stores of silver, accessible to miners at depths that can be reached without any great difficulty. Many of the lodes proper, containing both argentiferous lead and copper ores, as well as dry ores, are already worked at great depths without giving out. The fact that the dry ores have to be smelted with lead ores can not stand in the way of the extension of the production of silver, for there is a superfluity of lead ore, although the carbonate beds of Colorado, especially adapted for this purpose, will soon be exhausted. There would be a question here only of an increase in the cost of production, but this increase would be insignificant in case of a great rise in the price of silver. That at great depths zinc is found as a companion of silver instead of lead is a difficulty which may be considered already overcome by the recent advances in metallurgy.

Mining Expert Leuschner contended that a rapid extension of the production of silver was not possible if the price should greatly increase, because the erection of plants for that purpose would be necessary and would require time. But if the price of silver were to rise 50 or even 100 per cent above the present market value, every effort would be made to increase the production immediately, although the maximum production would not be attained for some years. How great the increased production would be if the old ratio of value of gold to silver were established by a bimetallic convention can not now be predicted. Certain it is, however, that in case such restoration were effected a yearly production not only of 4,750,000 kilograms might be expected, but of 5,000,000 kilograms, and before long a production of from 6,000,000 to 7,000,000 kilograms. Under the bimetallic system an overflow of the silver market, depressing the price of the metal, such as has existed so long already would not long have to be feared. Silver would be immediately transformed into money and miners would hasten to extract it from the earth.

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REPORTS OF THE SPECIAL AGENTS OF THE BUREAU OF THE MINT ON THE PRODUCTION OF THE PRECIOUS METALS IN 1894 IN THE SEVERAL STATES AND TERRITORIES.

I

ALASKA.

By Charles G. Yale.

There is very little variation in either the gold or silver product of Alaska from year to year.

The product of the Territory for the calendar year 1894, as shown by returns from producers received at the mint at San Francisco, was as follows:

Gold	$1, 282, 623. 13
Silver	5, 716. 55
Total	1, 288, 339. 68

The output of the year 1893 was:

Gold	$1, 038, 824. 00
Silver	10, 983. 92
Total	1, 049, 807. 92

A comparison of these figures shows a nominal increase in the gold product of $243,799.13 and a decrease in the silver product of $5,267.37.

The Alaska-Treadwell mine at Douglas Island returns $555,307.50 for 1894, while its product the previous year was $779,782.28; but this loss is about made up by the Alaska-Mexican mine at the same place, which did not appear in the record the previous year, and returns $204,042.46 for 1894.

The increase of gold product comes mainly from the mines on the tributaries of the Yukon River. The returns from the Yukon country in 1893 showed a yield of somewhat less than $200,000, while the estimate for 1894 aggregated $409,000. It is exceedingly difficult to obtain direct returns from that distant section, as most of the miners are only there a few months each summer. However, there are few organized companies, most of the work being done by individuals. There was a very large increase in the number of prospectors in the Yukon region in 1894, and a corresponding increase in the gold product. Some very rich ground was struck, and reports brought back by prospectors and miners induced a great many men to leave for the Yukon in the spring of 1895.

Those who have had experience in that section predict a doubled output of gold for 1895. Miners' wages are $10 per day on the creeks of the

Yukon region, so that the diggings must be rich to warrant employing men. So many men have gone there for the summer of 1895 that doubtless much new gold-bearing ground will be discovered. The estimate of the output of the Yukon River region for 1894 is below that given by the returned miners. The amounts carried by the two transportation companies are included in the Mint estimates, but it is impossible to know exactly the sums carried out of the country by individual miners who return to San Francisco and other cities at the end of the mining season.

II

ARIZONA.

By JOHN F. BLANDY,
Mining Engineer, Prescott, Ariz.

I stated in my report for the year 1893, "there is greater activity in the gold-mining industry at the present time throughout the Territory than ever before." This activity has continued and the result is that the production has risen from 58,911 ounces in 1893 to 96,313 in 1894, an increase of 63 per cent. The most of this increase has come from Yavapai County. The placer mining has added but little over the previous year, nor has there been, in the aggregate, any great improvement in the yield of free gold at the mines, i. e., gold caught on the amalgam plates at the mills, but the increase has been mainly from the auriferous base ores which have been sent to the smelters.

Encouraging reports come from nearly every county and mining district in the Territory, so there is every reason to believe that we shall have a continued growth in production. Many gold veins are known to exist in the various districts, but the capital necessary for their proper development is still wanting, and it has only been through patience and perseverance that the present successful mines have gained their positions. Mines that were very successful years ago with arastras still lie idle, but must become active again.

The continued drop in silver is still having its effect, and it can be said that not more than one or two small silver mines are at work; all other silver has been obtained from the gold ores of some few mines and from the lead ores.

I give the silver in ounces only, as it is impossible to more than approximate what has been its average worth.

Gold has been estimated at $20 per ounce.

PRODUCTION OF ARIZONA FOR THE YEAR 1894.

Counties.	Gold.				Silver.		
	By express.	In ores.	Total.	Value at $20 per ounce.	By express.	In ores.	Total.
	Ozs., fine.	*Ozs., fine.*	*Ozs., fine.*		*Ozs., fine.*	*Ozs., fine.*	*Ozs., fine.*
Cochise	....	4, 000	4, 000	$80, 000	....	306, 718	306, 718
Gila	252	500	752	15, 040	....	5. 000	5, 000
Graham	....	100	100	2, 000	....	1, 000	1, 000
Maricopa	3, 950	....	3, 950	79, 000	....	....	....
Mohave	583	5, 000	5, 583	111, 660	79, 386	700, 000	779, 386
Pima	7, 978	1, 000	8, 978	179, 560	17, 000	70, 000	87, 000
Pinal	11, 950	2, 000	13, 950	279, 000	3, 448	5, 000	8. 448
Yavapai	17, 977	25, 415	43, 392	867, 840	1, 050	255, 881	256, 931
Yuma	14, 608	1, 000	15, 608	312, 160	....	94, 970	94, 970
Total	57, 298	39, 015	96, 313	1. 926, 260	100. 884	1, 438, 569	1, 539, 453

	Pounds.
Lead reported	2, 625, 000
Copper reported	31. 162, 400

III

CALIFORNIA.

By CHARLES G. YALE.

The superintendent of the mint at San Francisco reports the product of precious metals of the State of California for the calendar year 1894 to have been:

Gold	$13,863,281.89
Silver	297,331.55
Total	14,160,613.44

As against the preceding year, as follows:

Gold	$12,538,779.60
Silver	537,158.37
Total	13,075,937.97

These figures show an increase of gold product of $1,324,502.29 and a decrease in silver of $239,826.82. The total increase of precious metal product for the year is $1,084,675.47.

The largest decrease in silver is shown naturally in the county which usually makes the largest silver product, viz, San Bernardino County.

Several material changes have taken place in the relative standing of the counties as to their bullion product. Nevada County, which has long held first place as a bullion producer, drops to third in the list. Calaveras County takes first place in 1894, having increased its yield over the previous year by $455,233.22, and is the only county in the State showing a yield of over $2,000,000. Placer County, from standing fourth in the list in 1893, takes second place in 1894, and shows the largest gain of any county in the State. Amador County, which was third among the gold-producing counties, now takes fourth place, being exceeded in product by Calaveras, Placer, and Nevada. Kern County shows a specially marked increase in gold product, as does San Diego. Other counties increasing their yield are: Butte, Eldorado, Fresno, Inyo, Los Angeles, Madera, Mono, Plumas, Riverside, Stanislaus, Tuolumne, and Yuba. The counties of Amador, Del Norte, Humboldt, Mariposa, Nevada, Sacramento, San Bernardino, Shasta, Sierra, Siskiyou, and Trinity return smaller products than in 1893. While the total increase of the product of the State for 1894 over the previous year is possibly somewhat less than many expected, in view of the increased activity in gold mining, it should be remembered that many investments made during the year have not reached a productive basis. A large amount of development work has been done in opening new mines or prospecting and reopening old ones. From many of these claims little or no bullion has as yet been produced, though they are expected to produce in 1895. The increased yield of gold, however, is upward of $1,500,000, though, as stated, the silver product is lessened for well-known reasons.

The activity in the quartz-mining regions of the State is at present very great. Prospectors are to be found in all sections. In many of the older camps properties long idle are being rehabilitated and put in shape to be productive. More capital has been invested in the gold mines of California in 1894 than for many years, but the results will scarcely be seen in the bullion product until the close of 1895.

Upward of 100 hydraulic mines in the drainage basins of the Sacramento and San Joaquin rivers have been granted licenses to mine by the California Débris Commission, under the Federal laws governing that class of mines in the sections referred to. Many of these, however, finished their impounding works for the débris too late in the season to do much work. Moreover, under the restrictions placed upon them the output is necessarily smaller than when working without having to care for the tailing or débris, as much less quantities of auriferous gravel can be washed. There are several hundred of this class of mines still idle, the owners being financially unable to construct the impounding works enforced by the Government commission.

In view of the investments recently made in the different classes of gold mines in California, especially quartz and drift, a material increase in gold product may be expected in 1895. People are seeking these mines as legitimate investments rather than for speculative purposes, and active development work is going on all over the State.

Amador County shows a falling off in yield from its mines of $179,007.73 as compared with that of 1893, which is entirely due to the lessened product of a few of the principal mines of the county in 1894.

Butte County has to its credit an increase of $160,818.51 over the yield of the previous year, the total for 1894 being $473,672.65.

There is a less amount from the mines at Bangor and a slight increase at Berry Creek, Brush Creek, and Berdans. The Cherokee mines also show an increase, as do those of Clipper Mills. At Enterprise there is a falling off, while there is a little difference in the results at Forbestown. From Hurleton reports were received in 1894 from mines making no returns the previous year. The mines at John Adams and Lumpkin show increased yields, as do those at Magalia. At Oroville an increase of upward of $60,000 is shown over the yield of 1893, and there is an increase at West Branch and Yankee Hill.

Calaveras County makes the most remarkable increase in bullion yield of any county in the State—$455,233.72—making a total of $2,124,548.47, which brings it to the first place in the bullion-producing counties of California. This is almost entirely due to the increased output of the mines at Angels Camp, notably those of the Utica Mining Company, now the largest gold producers in the United States.

In Del Norte County there is a decrease of about $2,000 as compared with the yield of 1893.

El Dorado County increased its yield by $71,233.61, making its total $367,063.67. The increase comes from the mines around Placerville, Shingle Springs, Grizzly Flat, and Nashville.

Fresno County mines show a nominal increase of less than $1,000.

There is a decrease in product in Humboldt County of upward of $5,000, mainly from the mines which sell their dust at Arcata.

Inyo County increases its total yield by $57,859.62, of which $26,694.24 is gold and $31,165.38 silver. The additional gold came from mines at Big Pine, Bishop, Keeler, and Lone Pine, while the silver was from Darwin and Independence.

Kern County shows a very large growth as a mining section, increasing its total yield to $350,406.91 in 1894 from $85,419.72 in 1893. It increased its gold product $227,041.19 and its silver product $37,946 over the previous year's record. The silver increase is mainly from certain mines near Caliente. Nearly all the districts show increased gold yield, but it mainly comes from mines around Kernville, Woody, White River, and the "desert mines" in the dry diggings of the Goler region. Very full returns were received from the county and many new mines reported.

The increase over the product of 1893 in Los Angeles County is upward of $20,000, from the mines at Acton and Azusa.

Madera County shows an increase in product of $16,960.83, the total for 1894 being $167,971.60.

Mariposa County lessened its product in 1894 by upward of $10,000, some few of the larger mines reporting a smaller amount than in 1893. In the latter part of 1894 renewed interest was shown in the mines of this county and much more development is being made than for many years past. Capitalists have taken hold of some of the more important groups of mines around Coulterville and vicinity and the yield of the mines of the county in 1895 is expected to be very largely increased. Many old mines are being reopened and prospecting for new ones is quite active.

Mono County increases its gold yield for 1894 over that of 1893 by $65,335, the silver product being about the same. The increase comes mainly from the mines at Bodie, which made larger products than in 1893.

Nevada County, which yielded $2,068,432.49 in 1893, gives returns of $1,830,630.31 for 1894, which is a reduction of product of $237,802.18.

This is mainly due to lessened yield of the larger mines about Grass Valley.

Placer County shows a gain of $500,000 over its yield in 1893, which was $1,351,865.70, while this year it is $1,851,878.79, bringing the county into second place and next to Calaveras as a gold producer. A large proportion of the gold comes from gravel mines, though more or less quartz is worked. A good proportion of the increase comes from the gravel mines at Iowa Hill, Forest City, and Michigan Bluff, most of which show a larger yield than in 1893. Some of the larger drift mines materially increased their yield.

Plumas County shows an increased yield over the year 1893 of $136,857.28, the returns for 1894 aggregating $499,358.83. The increased product comes from the mines around Butte Valley, Crescent Mills, Genesee, Greenville, Merrimac, Nelson Point, Prattville, Spanish Ranch, and Taylorville.

Riverside County increases its yield for 1894 over that of the previous year by upward of $50,000, the total being $93,322.50. The mines at Menifee, Perris, and Indio furnished the additional output.

Sacramento County shows a loss of about $20,000 from its previous year's product. Neither the mines at Michigan Bar nor Folsom yielded as much as in 1893.

San Bernardino County shows a very material falling off, losing $27,580.22 in gold and $298,777.11 in silver as compared with the returns of 1893. The loss in gold is due to a reduction of output in the Vanderbilt mines, and that in silver to lessened output in the mines at Calico. The principal company at the latter camp was closed down several months in 1894, owing to the railroad strike, and its mines produced $321,638 less than in 1893. Several mines at Ivanpah reported silver product in 1894 from which no returns were received the previous year.

San Diego County shows an increased gold yield of $160,738 over the returns of 1893. There is little change in the output of the mines at Julian and Banner; but the Golden Cross mine at Hedges made a larger product by $175,818 than it did in 1893, which accounts for the gold increase of the county.

The mines at La Panza, San Luis Obispo County, yielded $1,200 in 1894 as compared with $600 the previous year.

Shasta County shows a reduced output of $113,484.72 for 1894 as compared with the returns of 1893. The largest falling off is shown at French Gulch, from which place smaller and fewer returns were received than in 1893. Some of the larger mines at Kennett also returned reduced output. In some camps slight increase in product is shown, but not enough to overcome the deficiency in other places.

The returns from Sierra County are $225,667.11 less than in 1893. The main loss is accounted for by the greatly reduced output of certain large mines near Gibsonville and some of those at Sierra City.

Lessened product is also shown from the mines at Brandy City, Cold Lake, Port Wine, and St. Louis. Those at Alleghany, Forest City, Downieville, and Goodyear's Bar return an increased output.

Siskiyou County falls short of the amount produced in 1893 by $38,326.24, the total of 1894 being $760,781.83 as compared with $799,108.07 for 1893. Mines at the following localities show an increase of product in 1894 over 1893: Black Bear, Callahans, Cecilville, Fort Jones, Forks of Salmon, Gilta, Oro Fino, Sawyer's Bar, Tomar, Walker, and Yreka. From the following localities the mines show a falling off in the yield: Coles, Cottage Grove, Etna Mills, Hamburg, Henley, Happy Camp, Quartz Valley, Scotts Bar, and Seiad Valley.

Stanislaus County, which gave the nominal yield of $150 in 1893, gives returns for 1894 of $26,368.50 mainly from small and Chinese mines at La Grange.

Returns from Trinity County in 1893 were $1,122,994.50 and in 1894 they were $1,012,990.84, a reduction in yield for the latter year of $110,003.66. At the following localities an increase of yield is manifest: Big Bar, Carryville, Douglas City, Francis, Hay Fork, Helena, Lowdens Ranch, Minersville, and Weaverville. A decrease is shown in the following places: Cœur, Coleridge, Dedrick, Deadwood, Denny, Junction City, Lewiston, and Trinity Center.

Tuolumne County, which showed a yield of $356,064.22 in 1893, gives returns for 1894 of $548,520.22, a gain of $192,456. The largest increase is shown from mines around Sonora, but an increase is also shown in the following localities: Columbia, Groveland, Jamestown, and Soulsbyville.

Yuba County shows an increase of product of $76,641. More complete and larger returns were received in 1894 than in the previous year from the mines around Smartsville, Bullards Bar, Brownsville, and Strawberry Valley.

RECAPITULATION BY COUNTIES.

Counties.	Gold.	Silver.	Total.
Amador	$1,331,916.54	$280.27	$1,332,196.81
Butte	473,672.65	....	473,672.65
Calaveras	2,119,365.67	5,182.80	2,124,548.47
Del Norte	8,000.00	....	8,000.00
Eldorado	366,707.67	356.00	367,063.67
Fresno	8,202.00	....	8,202.00
Humboldt	41,326.10	13.86	41,339.96
Inyo	52,638.91	83,640.00	136,278.91
Kern	310,706.91	39,700.00	350,406.91
Lassen	35,283.00	....	35,283.00
Los Angeles	34,500.00	....	34,500.00
Madera	107,791.60	180.00	107,971.60
Mariposa	153,707.51	38.75	153,746.26
Merced	762.50	....	762.50
Mono	358,824.46	11,549.12	370,373.58
Monterey	8,000.00	....	8,000.00
Nevada	1,830,154.80	475.51	1,830,630.31
Placer	1,851,214.42	664.37	1,851,878.79
Plumas	499,358.83	....	499,358.83
Riverside	93,322.50	....	93,322.50
Sacramento	70,326.00	....	70,326.00
San Bernardino	130,419.78	148,242.89	278,662.67
San Diego	266,408.73	189.60	266,598.33
San Luis Obispo	1,200.00	....	1,200.00
Shasta	617,436.68	5,032.31	622,468.99
Sierra	604,721.54	....	604,721.54
Siskiyou	760,781.83	....	760,781.83
Stanislaus	26,368.50	....	26,368.50
Trinity	1,012,665.84	325.00	1,012,990.84
Tuolumne	547,448.06	1,072.16	548,520.22
Yuba	107,480.20	....	107,480.20
State mines[1]	32,568.66	388.91	32,957.57
Total	13,863,281.89	297,331.55	14,160,613.44

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[1] Refers to returns from Denver mint of California bullion not possible to aggregate with counties.

IV

COLORADO.

By W. J. Puckett.

Assayer in charge of the United States Mint at Denver, Colo.

The production of metals in Colorado for the calendar year 1894 was: Gold, $10,616,463; silver (at average price for year, 63 cents an ounce), $14,961,525; silver (at coinage value, $1.2929 per ounce), $30,704,375; lead, $3,199,175; copper, $761,575.

The year's feature has been the great activity in our gold camps, this being common to all gold districts of the State, though reaching its highest exhibition at Cripple Creek and Leadville.

A visitation of flood and fire in Boulder County, which destroyed railroad and milling property and obliterated wagon roads, seriously affected the output of this county.

The counties of Clear Creek and San Miguel have already experienced the good effects of increased investment and development, and open the year well equipped to record the best outputs in their history.

Gilpin County has maintained its steady, reliable output and added thereto. Conservative methods have always obtained in what is known as the "Kingdom of Gilpin," and it is an attractive field for cautious capitalists.

The labor troubles at Cripple Creek, in El Paso County, continuing nearly half the year, unquestionably deprived that camp of several millions in gold. Barring such incidents in 1895, the output of the Cripple Creek region should be exceedingly large. Earnest work is being prosecuted, and there is no lack of capital or facilities for treating the product. Two railroads to the camp have been completed within the year, called the Florence and Cripple Creek, and Midland Terminal. The district contains about a dozen bustling towns, viz, Cripple Creek, Victor, Goldfield, Anaconda, Lawrence, Arequa, Altman, Independence, Hulls Camp, Gillette, Grassy, and McCourt.

The high-grade ores are sent to the samplers and smelters of Denver and Pueblo, but the medium grade is treated at the stamp mills and other plants within the limits of the district.

The cyanide process has here done clean work in extracting the precious metal from the ore, but the proportion of even free milling material is such a small factor of the ore output as to be of no special importance. Experience has demonstrated that the chlorination treatment is the one best adapted for medium and low grades. At the Florence Reduction Works it is proposed to use this method of extraction as well as others. The different kinds of ore in the camp are numerous and there are a variety of different plants to treat it. There is the De Lamar chlorination plant at Lawrence, the United States Economic Reduction Company's plant at Florence, the chlorination plant of the El Paso Company at Gillette, which is rapidly nearing completion, the Cyanide and Denver mills at Mound City, the Summit mill at Gillette, the Beaver Park mill, the Colorado Springs mill at Beaver Park, and several other smaller plants. The erection of the Bartlett 100-ton plant is assured. The Florence Reduction Works will prove a very valuable acquisition for treating the low-grade and other ores.

The world-renowned carbonate camp of Leadville has, during the year, been astonishingly metamorphosed into a gold region of splendid results and rich promise. At an average depth of 500 feet well-known silver and lead properties have run into high-grade gold ore.

Referring to the Leadville gold belt, Mining Engineer Charles J. Moore says, in the Leadville Herald-Democrat's review:

> The Breece Hill region includes all the district from the Mike fault on the west to the Mosquito fault, probably, on the east, and from Big Evans Gulch on the north to California Gulch on the south, and is the main portion thus far developed of the gold belt. Gold everywhere, in almost every mine opened down to the contact within this area! This region is intersected both with fissures and dikes. The effect of dikes has been twofold: First, in connection with the fissures that have been formed in many instances along one or both walls and the constituents of the dike porphyry have had a favorable chemical influence upon the ore solutions circulating in the fissures, thereby inducing an ore deposition stronger and richer than the average elsewhere; second, where these dikes intersect the contact planes between porphyry and limestone, where the ore solutions have usually flowed throughout the Leadville district they have acted as dams, interrupting the flow and giving time for the necessary replacement of limestone or porphyry country by ore particles. The developments in the Little Johnny, or Ibex, mine have proven these facts. Regarding the proper horizon to prospect for the main gold deposit, it should be stated that there are two different sheets of porphyry above the blue limestone in Idaho Park (Ibex property), and the main gold-bearing contact vein is in the contact between these two porphyries, gray porphyry being the upper and white porphyry the under sheet, but the gold also occurs in the regular contact between the white porphyry and blue limestone. So far it is not quite settled among the experts as to whether the ore is a replaced limestone, a replaced porphyry, or an original vein filling. There is evidence to support any one of these theories.
>
> So far as developments show, there are three main chutes thus far opened, viz, Highland Chief, Little Johnny, and Little Ella; but the course of these is by no means certain, and it is impossible to correlate them correctly with those of Printer Boy and Long and Derry hills, on account of crossing Weston fault on their course, with a probable horizontal, as well as vertical, displacement. So far the Little Johnny ore chute appears to have a course south 10° west, and the Little Ella ore chute north 32° east. Unquestionably they are continuous in their courses, with the exception of displacements by faulting, and unquestionably, also, in my judgment, they are the same as the gold-bearing ore chutes in the Printer Boy and Long and Derry hills. They can thus be considered as proven in length for fully 3 miles.

Undoubtedly, besides the three chutes named as already proven, others will be proven from time to time running parallel to the first, and the resources of this region in valuable ore deposits are thus incalculable.

As regards the horizon on which to prospect for these gold-bearing ore chutes, the facts on Printer Boy hill seem to prove that they descend in the formations as the chutes are followed in their southward course.

The principal mines thus far opened on the gold belt which have produced or are producing ore are the following: The Ibex Company (comprising Little Johnny, Uncle Sam, Little Stella, etc.), Little Vinnie, Nevada, Little Ella, Valley, Midnight, Australian, Virginius, Fanny Rawlings, St. Louis (Colorado Prince and Miner Boy), Eliza, Highland Chief, Nettie Morgan, Great Hope; and those which are being worked at present, with every promise of success, are the Resurrection (to open the northern extension of the Little Ella ore chute), Triumph, Irene, Garbutt, Antelope, Ocean Wave, Black Prince, Curran, Chemung, and many others. The above are all in the vicinity of Idaho Park.

The oldest gold-producing mine on the hill is the Antioch, at the head of Whites Gulch, a dike fissure vein with a tunnel 1,600 feet long cutting it at depth.

The following statistics of the State's output, by counties, are based on reliable returns of refineries, mills, placer properties, etc.:

VALUE OF BULLION TREATED AT THE MINT OF THE UNITED STATES AT DENVER DURING THE CALENDAR YEAR 1894.

[NOTE.—In computing the values of the metals the following equivalents were employed: Gold, \$20.67 per ounce, fine, silver, \$1.2929 (coinage value) per ounce, fine, lead, \$60 per ton; copper, 9½ cents per pound.]

Source.	Value of gold.	Coinage value of silver.	Total value.
COLORADO—COUNTIES.			
Arapahoe	\$95.90	\$0.07	\$95.97
Boulder	73,478.57	299.84	73,778.41
Clear Creek	59,096.40	605.10	59,701.50
Chaffee	105,119.48	897.91	106,017.39
Conejos	191.25	.86	192.11
Dolores	776.56	9.52	786.08
Delta	278.19	4.39	282.58
El Paso	123,561.21	161.44	123,722.65
Eagle	76.11	.34	76.45
Fremont	84.76	.55	85.31
Garfield	70.99	.19	71.18
Gilpin	658,775.65	4,426.24	663,201.89
Gunnison	835.62	5.65	841.27
Hinsdale	92.37	.28	92.65
Huerfano	340.43	.88	341.31
Jefferson	2,457.14	14.05	2,471.19
Lake	18,205.67	111.89	18,317.56
La Plata	2,334.30	11.92	2,346.22
Mesa	355.65	1.76	357.41
Montrose	2,463.21	22.43	2,485.64
Mineral	106.73	.41	107.14
Montezuma	237.61	.60	238.21
Ouray	5,212.51	40.24	5,252.75
Park	55,888.07	393.31	56,281.38
Pitkin	1,029.37	4.64	1,034.01
Pueblo	411.63	4.25	415.88
Rio Grande	1,116.26	9.90	1,126.16

VALUE OF BULLION TREATED AT THE MINT OF THE UNITED STATES AT DENVER DURING THE CALENDAR YEAR 1894—Continued.

Source.	Value of gold.	Coinage value of silver.	Total value.
COLORADO—COUNTIES—continued.			
Routt	$10,003.50	$126.74	$10,130.24
Saguache	160.82	.84	161.66
San Juan	26,338.95	315.66	26,654.61
San Miguel	331,305.13	4,500.66	335,805.79
Summit	86,256.73	857.09	87,113.82
County unknown	216,377.51	2,667.38	219,044.89
Smelters[1]	3,301,581.53	1,178.08	3,302,759.61
Total	5,084,715.81	16,675.11	5,101,390.92
OTHER STATES.			
Arizona	171,761.68	1,794.55	173,556.23
Alaska	2,629.61	10.00	2,639.61
California	32,568.68	298.91	32,867.59
Montana	1,364.88	2.10	1,366.98
New Mexico	176,406.63	790.13	177,196.76
Nevada	56,662.49	155.08	56,817.57
Idaho	16,244.66	69.57	16,314.23
Utah	22,466.63	105.21	22,571.84
South Dakota	16,423.53	50.12	16,473.65
Oregon	364.95	2.51	367.46
Wyoming	13,207.19	42.62	13,249.81
Washington	190.61	.71	191.32
Total	510,291.54	3,321.51	513,613.05
MISCELLANEOUS.			
Jewelry	18,509.05	159.89	18,668.94
Coin	700.29		700.29
Mint bars redeposited	2,725.62	49.58	2,775.20
Total	21,934.96	209.47	22,144.43
Grand total	5,616,848.18	20,300.22	5,637,148.40

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[1] Of the smelter deposits, $2,770,021.29 was Colorado production.

SUMMARY OF OUTPUT, BY COUNTIES, FOR THE CALENDAR YEAR 1894.

Name of county.	Value of gold.	Coinage value of silver.	Total value.
Arapahoe	$96	....	$96
Boulder	527,615	$99,875	627,490
Chaffee	134,853	33,667	168,520
Clear Creek	721,181	2,839,488	3,560,669
Conejos	191	1	192
Custer	165	1,501	1,666
Delta	278	4	282
Dolores	215,455	1,421,049	1,636,504
Eagle	62,101	82,484	144,585
El Paso	2,908,702	33,413	2,942,115
Fremont	85	426	511
Garfield	71	....	71
Gilpin	2,122,838	301,918	2,424,756
Gunnison	9,006	138,396	147,402
Hinsdale	95,293	522,127	617,420
Huerfano	340	1	341
Jefferson	2,457	14	2,471
Lake	1,657,002	10,048,606	11,705,608
La Plata	116,690	550,568	667,258
Mesa	356	2	358
Montrose	2,463	22	2,485
Mineral	45,116	2,362,176	2,407,292
Montezuma	238	1	239
Ouray	199,249	1,212,446	1,411,695
Park	108,891	57,787	166,678
Pitkin	5,942	7,808,850	7,814,792
Pueblo	412	4	416
Rio Grande	18,809	1,658	20,467
Routt	10,004	127	10,131
Saguache	19,591	802,148	821,739
San Juan	360,320	463,062	823,382
San Miguel	868,343	666,498	1,534,841
Summit	231,432	570,785	802,217
County unknown	170,878	685,271	856,149
Total	10,616,463	30,704,375	41,320,838

Total value of Colorado lead product, 1894	$3,199,175
Total value of Colorado copper product, 1894	761,575

V

IDAHO.

By Frank F. Church,

Assayer in charge United States Assay Office at Boise, Idaho.

The leading mining districts of this State now attracting general attention, and which are the seat of considerable activity, are the Delamar and Silver City districts of Owyhee County and the Cœur d'Alene district of Shoshone County. The first two produce gold and silver bullion, the silver predominating, but there is sufficient gold to make the industry very profitable. Within these districts are a number of mines which have few or no equals in the West for richness and quantity of ore beds.

The foregoing applies equally well to the great silver-lead mines of the Cœur d'Alene district. This district has increased its output over the previous year notwithstanding the continued dull market for the product. The Murray district is also in Shoshone County. The placer grounds of this locality show no abatement, the output of which is steady and very substantial. The gold-bearing quartz mines are also quite productive and are very promising in character.

The Warren district of Idaho County is fast taking the lead in profitable quartz and placer mining. This district will add materially to the production of the State for the ensuing year.

The many good ledges in Boise and Lemhi counties have been developed within the year to such an extent that their profitable operation is no longer a question.

The Seven Devils district, in Washington County, is exceedingly rich in copper, but has been developed meagerly on account of the lack of transportation.

The flour gold, to be found in great quantities on the famous Snake River, has attracted unusual attention and has contributed largely to the increased production of the State.

PRODUCT OF GOLD AND SILVER IN IDAHO, BY COUNTIES, FOR THE CALENDAR YEAR 1894.

Counties.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Value.	
Ada	739	$15, 276	204	$264	$15, 540
Alturas	836	17, 282	294, 207	380, 380	397, 662
Bingham	1, 788	36, 961	225	291	37, 252
Boise	15, 859	327, 835	24, 876	32, 162	359, 997
Cassia	1, 108	22, 904	195	252	23, 156
Canyon	1, 029	21, 271	220	284	21, 555
Custer	1, 253	25, 902	71, 120	91, 951	117, 853
Elmore	5, 139	106, 232	2, 708	3, 501	109, 733
Lemhi	13, 217	273, 220	4, 552	5, 885	279, 105
Logan	1, 407	29, 085	604	781	29, 866
Idaho	12, 116	250, 460	14, 832	19, 176	269, 636
Owyhee	37, 915	783, 773	1, 004, 792	1, 299, 096	2, 082, 869
Shoshone	17, 531	362, 398	2, 343, 314	3, 029, 671	3, 392, 069
Washington	750	15, 504	12, 000	15, 515	31, 019
Other counties	1, 000	20, 672	500	646	21, 318
Total	111, 687	2, 308, 775	3, 774, 349	4, 879, 855	7, 188, 630

TOTAL METAL PRODUCTION OF IDAHO DURING THE CALENDAR YEAR 1894.

Metal.	Quantity.	Value.
Gold ounces, fine	111, 687	$2, 308, 775
Silver do	3, 774, 349	4, 879, 855
Lead pounds	74, 441, 436	2, 605, 450
Total		9, 794, 080

GOLD AND SILVER BULLION PRODUCED IN IDAHO DEPOSITED AT GOVERNMENT INSTITUTIONS DURING THE CALENDAR YEAR 1894.

Institution.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Value.	
MINT.					
San Francisco	4, 289. 744	$88, 676. 87	1, 092. 29	$1, 412. 22	$90, 089. 09
Denver	785. 905	16, 246. 10	124. 00	160. 32	16, 406. 42
Philadelphia	85. 990	1, 777. 48	24. 71	31. 95	1, 809. 43
New Orleans	26. 366	545. 02	5. 70	7. 37	552. 39
ASSAY OFFICE.					
Boise	26, 166. 056	540, 900. 37	7, 512. 49	9, 712. 90	550, 613. 27
Helena	6, 687. 624	138, 245. 45	1, 611. 97	2, 084. 11	140, 329. 56
New York	298. 575	6, 172. 09	406. 76	525. 90	6, 697. 99
Total	38, 340. 260	792, 563. 38	10, 777. 92	13, 934. 77	806, 498. 15

SOURCE OF THE DEPOSITS AT THE UNITED STATES ASSAY OFFICE AT BOISE CITY, IDAHO, DURING THE CALENDAR YEAR 1894.

Counties.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Value.	
Ada	739.039	$15,277.29	204.35	$264.20	$15,541.49
Alturas	87.395	1,806.61	41.90	54.17	1,860.78
Bingham	1,008.907	20,855.96	84.47	109.21	20,965.17
Bannock	118.233	2,444.09	6.53	8.44	2,452.53
Boise	12,759.606	263,764.47	3,276.34	4,235.98	268,000.45
Canyon	1,029.042	21,272.19	120.55	155.86	21,428.05
Cassia	630.446	13,032.47	69.95	90.44	13,122.91
Custer	252.941	5,228.75	96.69	125.01	5,353.76
Elmore	3,154.962	65,218.85	1,408.33	1,820.83	67,039.68
Fremont	90.449	1,869.75	13.27	17.16	1,886.91
Lemhi	854.447	17,662.98	172.11	222.52	17,885.50
Logan	784.210	16,211.06	78.27	101.20	16,312.26
Idaho	366.290	7,571.89	132.57	171.40	7,743.29
Owyhee	1,066.061	22,037.44	1,197.32	1,548.02	23,585.46
Shoshone	3,140.027	64,910.12	591.78	765.11	65,675.23
Washington	84.001	1,736.45	18.06	23.35	1,759.80
Total	26,166.056	540,900.37	7,512.49	9,712.90	550,613.27
Deposits of—					
Oregon	12,771.250	264,005.17	2,459.30	3,179.63	267,184.80
Washington	4.174	86.29	1.28	1.65	87.94
Redeposits	8,793.143	181,770.40	1,970.93	2,548.21	184,318.61
Total	21,568.567	445,861.86	4,431.51	5,729.49	451,591.35
Grand total	47,734.623	986,762.23	11,944.00	15,442.39	1,002,204.62

VI

MONTANA.

By E. B. Braden,

Assayer in charge United States Assay Office, Helena, Mont.

The product of gold and silver in Montana during the year 1894 was: Gold, 187,135.253 ounces, fine, of the value of $3,868,428.87; silver, 13,638,967.29 ounces, fine, of coinage value of $17,634,219.78.

The gold product shows an increase of 9,285.569 ounces, fine, valued at $191,949.63.

The silver product shows a decrease of 1,300,020.47 ounces, fine, valued at $1,680,834.63.

By the following tables it will be seen that the total value of all metals produced in this State during the calendar year 1894 was $39,466,919.13, a slight decrease compared with the previous year, which was due to the lower price of silver and copper. The figures are based upon reports received from United States institutions, smelters, and refiners handling Montana products, and from reports received from various producers in the State.

The system introduced by this office of publishing only aggregates, and not specifying the individual producers, shows continually improving results in the number and character of reports received, and certainly commends itself as a most desirable manner of compiling these results.

Attention is called to the table showing the amount of gold and silver produced in the copper and lead ores of the State.

Although the receipts of the office show a large percentage of gain in gold, the total increase for the State is not correspondingly as great; this is due to the material decrease in the output of the silver mines, all of which carry a large proportionate value in gold.

The gain in gold deposited in the United States assay office is very gratifying, as exhibiting the attention being paid to the development of strictly gold properties. Many new ones, and a number of old mines, long unworked, are now being operated with good results, and I believe the future will show a constant increase in the gold product of the State.

DEPOSITS AT HELENA ASSAY OFFICE DURING THE CALENDAR YEAR 1894.

Source.	Gold.		Silver.		Total value.
	Ounces, standard.	Value.	Ounces, standard.	Commercial value.	
MONTANA—COUNTIES.					
Beaverhead	2, 476. 382	$46, 072. 22	321. 15	$177. 63	$46, 249. 85
Cascade	68. 203	1, 268. 89	3. 06	1. 66	1, 270. 55
Choteau	229. 248	4, 265. 09	20. 69	11. 27	4, 276. 36
Deer Lodge	26, 755. 600	497, 778. 43	6, 208. 15	3, 442. 67	501, 221. 10
Fergus	4, 189. 867	77, 951. 00	388. 72	222. 49	78, 173. 49
Granite	8, 005. 739	148, 943. 94	2, 031. 48	1, 100. 33	150, 044. 27
Jefferson	3, 220. 382	59, 914. 06	513. 01	278. 37	60, 192. 43
Lewis and Clarke	36, 048. 579	670, 670. 98	20, 212. 08	11, 099. 01	681, 769. 99
Madison	7, 900. 224	146, 980. 84	1, 963. 11	1, 075. 59	148, 056. 43
Meagher	3, 903. 935	72, 631. 22	697. 25	382. 86	73, 014. 08
Missoula	4, 328. 179	80, 524. 22	239. 44	132. 35	80, 656. 57
Park	1, 941. 600	36, 122. 75	218. 87	121. 16	36, 243. 91
Silverbow	4, 930. 009	91, 721. 00	1, 178. 25	639. 61	92, 360. 61
Total	103, 997. 947	1, 934, 844. 64	33, 995. 26	18, 685. 00	1, 953, 529. 64
MISCELLANEOUS.					
Alaska	74. 983	1, 395. 03	15. 37	8. 61	1, 403. 64
British Columbia	516. 657	9, 612. 22	303. 13	169. 75	9, 781. 97
Idaho	7, 430. 693	138, 245. 31	1, 791. 08	983. 47	139, 228. 78
Washington	2, 290. 782	42, 619. 21	904. 08	489. 69	43, 108. 90
Wyoming	12. 139	225. 84	. 81	. 43	226. 27
Jewelry, etc	47. 796	889. 24	14. 45	8. 03	897. 27
Redeposits	406. 660	7, 565. 76	262. 46	139. 85	7, 705. 61
Total	10, 779. 710	200, 552. 61	3, 291. 38	1, 799. 83	202, 352. 44
Grand total	114, 777. 657	2, 135, 397. 25	37, 286. 64	20, 484. 83	2, 155, 882. 08

BULLION OF MONTANA PRODUCTION DEPOSITED AT HELENA ASSAY OFFICE DURING THE CALENDAR YEAR 1894.

Description.	Gold.		Silver.		Total value.
	Ounces, standard.	Value.	Ounces, standard.	Commercial value.	
Placer gold	23, 632. 113	$439, 666. 86	3, 172. 00	$1, 729. 84	$441, 396. 70
Mill bullion	80, 365. 834	1, 495, 177. 78	30, 823. 26	16, 955. 16	1, 512, 132. 94
Total	103, 997. 947	1, 934, 844. 64	33, 995. 26	18, 685. 00	1. 953, 529. 64

BULLION OF MONTANA PRODUCTION DEPOSITED AT THE UNITED STATES MINTS AND ASSAY OFFICES DURING THE CALENDAR YEAR 1894

Institution.	Gold.		Silver.		Total value.
	Ounces, fine.	Value	Ounces, fine.	Coining value.	
ASSAY OFFICE.					
Helena	93, 598. 152	$1, 934, 844. 64	30, 595. 73	$39, 558. 15	$1, 974, 402. 79
New York	14, 225. 368	294, 064. 28	361, 438. 90	467, 314. 93	761, 379. 21
MINT.					
San Francisco	466. 030	9, 633. 69	56. 82	73. 46	9, 707. 15
Philadelphia	178. 497	3, 689. 85	10. 55	13. 64	3, 703. 49
Denver	66. 031	1, 364. 98	1. 00	1. 29	1, 366. 27
Total	108, 534. 078	2, 243, 597. 44	392, 103. 00	506, 961. 47	2, 750, 558. 91

PRODUCTION OF GOLD AND SILVER IN COPPER AND LEAD ORES IN MONTANA FOR THE CALENDAR YEAR 1894.

Ores.	Gold.	Silver.
	Ounces, fine.	*Ounces, fine.*
In copper ores	24, 400	6, 750, 000
In lead ores	20, 400	4, 400, 000
Total	44, 800	11, 150, 000

PRODUCTION OF COPPER AND LEAD IN MONTANA FOR THE CALENDAR YEAR 1894.

Summary by counties.	Copper.	Lead.
	Pounds.	*Pounds.*
Beaverhead	362, 897	3, 110, 070
Jefferson	30, 000	448, 311
Lewis and Clarke		6, 952, 304
Meagher		98, 094
Missoula		2, 663, 720
Silver Bow	185, 194, 385	50, 227
Custom smelters not included above	723, 190	10, 243, 462
Total	186, 310, 472	23, 566, 188

TOTAL METAL PRODUCTION OF MONTANA DURING THE CALENDAR YEAR 1894.

Metal.		Quantity.	Value per pound.	Total value.
Gold	ounces, fine	187, 135. 253		$3, 868, 428. 87
Silver	do	13, 638, 967. 29		17, 634, 219. 78
Copper	pounds	186, 310, 472.	$0. 9¼	17, 233, 718. 66
Lead	do	23, 566, 188.	.3$\frac{1}{10}$	730, 551. 82
Total				39, 466, 919. 13

SUMMARY OF PRODUCTION OF GOLD AND SILVER IN MONTANA DURING CALENDAR YEAR 1894, BY COUNTIES.

Counties.	Gold.		Silver.	
	Ounces, fine.	Value.	Ounces, fine.	Coining value.
Beaverhead	2,572.082	$53,169.65	836,545.17	$1,081,593.75
Cascade	61.383	1,268.90	2.75	3.55
Choteau	206.323	4,265.07	18.62	24.07
Deer Lodge	28,167.950	582,283.20	36,394.36	47,054.86
Fergus	3,770.880	77,950.90	349.85	452.32
Granite	9,528.935	196,980.57	469,162.12	606,593.44
Jefferson	8,111.464	167,678.84	765,483.04	989,715.44
Lewis and Clark	46,844.379	968.359.25	1,007,025.02	1,302,012.14
Madison	8,733.388	180,535.15	87,854.42	113,589.54
Meagher	3,995.542	82,595.18	1,212,890.53	1,568,181.69
Missoula	3,895.361	80,524.25	286,842.50	370,867.07
Park	1,747.440	36,122.79	196.98	254.68
Silver Bow	36,768.015	760,062.33	7,561,124.46	9,775,999.30
Custom smelters, mints, and assay offices, not elsewhere enumerated	32,732.111	676,632.79	1,375,077.47	1,777,877.93
Total	187,135.253	3,868,428.87	13,638,967.29	17,634,219.78

VII

NEVADA.

By J. W. ADAMS,

Superintendent of the United States Mint, Carson City, Nev.

Nevada's production of the precious metals for the year 1894, with a large number of producers throughout the State unreported, was: Gold, $1,220,700; silver (coining value), $997,500.

Compared with the year 1893, these figures show a gain in gold of $235,000 and a falling off in silver of $783,800, a net decrease of $548,800.

Silver mining, owing to the continued decline in the price of silver, is virtually at a standstill in this State. Nearly all of the large silver producing mines are closed down, and further developments are practically abandoned. Of the total silver product of the State for the past year ($997,500) the Comstock lode is credited with $542,000, of which amount one mine, the Consolidated California and Virginia Mining Company, produced $305,095, nearly one-third of the entire State product. The ore body of this mine carries a high percentage of gold, enabling it to be worked at a profit.

Encouraging reports come from all over the State regarding new and valuable gold discoveries, especially in Lincoln, White Pine, and Esmeralda counties. The most promising of the new discoveries is Silver Star district, Esmeralda County. The mines of this district being as yet undeveloped it is too early to say what the future of the district may be, but experts from abroad who have examined the properties state that there is from $700,000 to $1,000,000 in high-grade gold ore in sight. Silver Peak district, also in Esmeralda County, one of the oldest discoveries in the State, is soon to resume operations. The construction of a large mill and operations on a large scale are contemplated. Should this be done it will result in a large output of gold.

Reports from Ferguson district, Lincoln County, are very promising. Within the past year a syndicate has purchased the most promising group of mines and expended from $400,000 to $500,000 in erecting reduction works and further developing their properties, and they expect to realize largely on their investments.

From the foregoing statements, which I consider conservative estimates, together with the additional stimulus given to gold mining throughout the State, I am of the opinion that the gold product for the year 1895 will largely exceed that of the present year. There is no future for silver mining in this State until the adverse circumstances surrounding this industry are removed.

The following tables are compiled from the reports received from mining companies, United States mints and assay offices, and the reports of the county auditors to the State comptroller for the three quarters ended September 30, 1894.

The increased product estimated for the quarter ended December 31 is due to the increased production of the Consolidated California and Virginia Mining Company, from which mines I have received a full and complete report.

The total production of both gold and silver was, I am satisfied, largely in excess of my estimate, as Wells, Fargo & Co.'s reported shipments show a far greater yield.

PRODUCT OF NEVADA FOR THE YEAR 1894.

[Estimated by Mr. J. W. Adams.]

Counties.	Gold.	Silver.	Total.
Churchill	$2,000	$500	$2,500
Douglas	12,000	300	12,300
Esmeralda	82,000	3,000	85,000
Elko	57,000	95,000	152,000
Eureka	130,000	172,000	302,000
Humboldt	56,000	5,000	61,000
Lander	18,700	52,000	70,700
Lincoln	212,000	107,000	319,000
Lyon	72,000	5,000	77,000
Nye	2,000	5,000	7,000
Ormsby	....	....	....
Storey	531,000	542,000	1,073,000
Washoe	6,000	700	6,700
White Pine	40,000	10,000	50,000
Total	1,220,700	997,500	2,218,200

STATEMENT ABSTRACTED FROM QUARTERLY ASSESSMENT ROLLS OF THE PROCEEDS OF THE MINES OF NEVADA.

FOR THE THREE QUARTERS ENDED SEPTEMBER 30, 1894.

Counties.	Quantity extracted.		Gross yield or value.	Actual cost of—		Actual cost of reduction.		Total cost.
	Tons.	Pounds.		Extracting.	Transportation.	Free milling.	Freiberg process.	
Esmeralda[1]	91	1,090	$5,997.22	$5,314.54	$214.72	$176.94	....	$5,706.20
Elko	1,639	950	54,138.70	47,034.01	3,867.92	15,216.49	$599.04	66,717.46
Eureka	6,656	63	145,557.93	115,722.93	8,460.34	....	34,162.78	158,346.05
Lincoln	4,965	1,363	141,484.28	43,437.32	20,807.39	43,795.12	....	108,039.83
Lyon[2]	155	....	8,600.00	4,739.00	155.00	930.00	....	5,824.00
Storey	12,149	942	307,579.32	225,836.08	4,850.39	62,298.04	....	292,984.51
Total	25,655	4,408	663,357.45	442,083.88	38,355.76	122,416.59	34,761.82	637,618.05

[1] Esmeralda County reports for quarter ended June 30 only.

[2] Lyon County reports for quarter ended March 31 only.

STATEMENT ABSTRACTED FROM QUARTERLY ASSESSMENT ROLLS OF THE PROCEEDS OF THE MINES OF NEVADA—Continued.

ESTIMATED FOR QUARTER ENDED DECEMBER 31, 1894.

Counties.	Quantity extracted.		Gross yield or value.	Actual cost of—		Actual cost of reduction.		Total cost.
	Tons	Pounds.		Extracting.	Transportation.	Free milling.	Freiberg process.	
Esmeralda	30	363	$1,999.07	$1,771.51	$71.57	$58.98	....	$1,902.06
Elko	546	317	18,046.23	15,678.00	1,289.31	5,072.16	$199.68	22,239.15
Eureka	2,218	21	48,519.31	38,574.93	2,820.11	....	11,387.59	52,782.63
Lincoln	1,655	454	47,164.76	14,479.10	6,935.79	14,598.70	....	36,013.59
Lyon	52	....	2,866.66	1,579.66	52.00	310.00	....	1,941.66
Storey	9,210	326	397,697.44	203,552.73	4,386.93	78,977.26	....	286,916.92
Total	13,711	1,481	516,293.47	275,635.93	15,555.71	99,017.10	11,587.27	401,796.01

SUMMARY FOR THE YEAR 1894.

[Reported to State comptroller by county auditors.]

Items.	Three quarters ended September 30, 1894.[1]		Quarter ended December 31, 1894 (estimated).		Total product.
	Ores.	Tailings.	Ores.	Tailings.	
Gross yield or value	$663,357.45	$33,827.68	$516,293.47	$27,498.37	$1,240,976.97
Actual cost of extracting	442,083.88	4,175.00	275,635.93	....	....
Actual cost of transportation	38,355.76	4,983.42	15,555.71	....	....
Free milling	122,416.59	19,661.46	99,017.10	....	....
Freiberg process	34,761.82	....	11,587.27	....	....
Total cost	637,618.05	28,819.88	401,796.01	21,623.80	1,089,857.74

[1] Quantity extracted for three quarters ended September 30, 1894, 25,657 tons and 408 pounds; tailings, 4,877 tons; total, 30,534 tons and 408 pounds.

RECAPITULATION.

Source of production.	Value.
Product for three quarters ended September 30, 1894, as reported by county auditors to State comptroller	$697,185.13
Product for quarter ended December 31, 1894 (estimated)	543,791.84
Estimated product for year not reported to State comptroller by county auditors	977,223.03
Total product	2,218,200.00

VIII

NEW MEXICO.

By Walter C. Hadley.

During the year 1894 no new enterprises of importance were begun in New Mexico for the mining of silver alone, owing to the low market value of the metal, and the production of the silver districts that were in former years very prosperous was even more limited than in 1893. One by one the owners of silver mines became satisfied that it is impossible to produce silver at 60 cents an ounce and suspended operations. Without exception every strictly silver mine in the Territory where water had to be handled has closed down. There are yet occasional shipments from Georgetown, Kingston, Lake Valley, and Hermosa, but the aggregate number of ounces of silver shipped, as shown in the table below, is so small as to indicate that mining for that metal alone in New Mexico has practically ceased.

The condition of gold mining in the Territory is, however, very different. There is a larger number of men employed in the industry to-day than there has ever been before, although the output for the year 1894 did not increase over that of 1893, as was to have been expected. The reason for this is that two or three of the larger producers did not have the output that was possible, but there was a larger number of properties worked.

The silver-lead districts of Kelly, in Socorro County, Hadley and Cooks Peak, in Grant County, and Organ district, in Dona Ana County, have not produced anything like as much ore as formerly, owing to the low price of lead, and these ores carry very little silver as a rule and only a trace of gold.

Copper has not been mined for that metal alone anywhere in the Territory, but is produced in several places where the gold ores mined are in sulphurets.

The United States land court appointed during the last Administration has settled the titles to many land grants that were in doubt, and in many cases the alleged titles to vast areas were declared invalid, thus throwing open to the prospector and miner some of the most promising of the metal-bearing sections of the Territory. In the north also very satisfactory methods have been adopted by some of the grant owners to give title at a nominal cost to the miner who would acquire and develop mining property on the grants. During the year there was not a little activity in Colfax County, where gold has been known to exist, but where progress was hindered by uncertainty as to titles.

The most important developments during the year were those made in the Cochiti mining district of Bernalillo County, which is situated about 20 miles west of the Rio Grande River and equidistant from Albuquerque and Santa Fe. Here, also, a land grant interfered with the purposes of the discoverers and owners of valuable property, but a decision has just been reached in the land court which settles all doubt, it is believed, concerning the rights of the miners to the metals and the ground in which they have been found. It is expected that a great deal of ore will be produced in this district the present year that will run from $75 to $100 per ton, of which about one-half is silver and the other half gold. A mill has been erected in the camp, and shipments have been regularly made during the year to the smelters.

The Mogollon mines, worked for gold chiefly, situated in the western portion of Socorro County, are little talked of, but show constant increase in bullion product. White Oaks, in Lincoln County, produced about the same amount of gold as in 1893, and the same may be said of Pinos Altos and Hillsboro.

Very important are the new enterprises in Hanover district, the terminus of the Silver City and Northern Railroad, in Grant County, where a smelter has just been completed and blown in that will treat all of the ores of this section, which include gold, silver, and copper. The iron ores that abound in this district are exceedingly desirable for smelting purposes and have been shipped during the year in large quantities to Pueblo and elsewhere.

Following is a statement of the production of metals for the year 1894. Silver is here estimated at $1 per ounce; estimated at the value to-day (60 cents per ounce) the silver product would be only $128,436. Gold is figured at $20 per ounce and copper at 10 cents per pound; lead at 3 cents per pound:

VALUE OF METAL PRODUCT OF NEW MEXICO FOR CALENDAR YEAR 1894.

Counties.	Gold.	Silver.	Lead.	Copper.	Total.
Bernalillo	$36,000	$24,000	....	....	$60,000
Colfax	78,000	27,000	$2,000	....	107,000
Dona Ana	21,000	3,000	5,000	....	29,000
Grant	185,000	26,000	13,200	$2,600	226,800
Lincoln	148,500	12,000	....	....	160,500
Santa Fe	28,600	4,560	....	....	33,160
Sierra	192,000	77,500	3,100	11,000	283,600
Socorro	93,450	30,000	25,000	....	148,450
Other counties	20,000	10,000	1,000	....	31,000
Total	802,550	214,060	49,300	13.600	1,079,510

IX

OREGON.

By Charles G. Yale.

The returns received at the mint at San Francisco from mines and mining companies in Oregon for 1894 are as follows:

Gold	$2,113,356.42
Silver	10,351.00
Total	2,123,707.42

For 1893 the figures were:

Gold	$1,690,950.52
Silver	13,557.50
Total	1,704,508.02

This statement shows that the increase of the gold output of 1894 over the previous year was $422,405.90 and the decrease in silver $3,206.50, a net increase of $419,199.40. According to the returns received at San Francisco this increase is mainly due to the mines in Union County, which more than doubled their yield over the previous year. The gold-mining sections of Oregon are attracting much more attention than formerly, and many new mines are being opened. Capital is being invested in the more prominent mining regions, and prospecting is more active than ever.

Baker County has usually shown the largest yield of any in the State, but this year it takes the second place. The output of the mines in this county for 1894 was, according to returns received at the San Francisco mint, $450,246.72, while in 1893 the figures were $739,400.94. Many companies which reported in 1893 failed to make returns in 1894, so that the falling off in product may be more apparent than real. Every effort was made to obtain replies to the inquiries sent out regarding product for the year, but in so many instances no replies were received, notwithstanding repeated requests, that the results of work for the year do not make a satisfactory showing.

Very little difference is shown in the mines about Auburn. It is the mines around Baker City that show the largest falling off in this county. This is not only in the less number of returns, but those mines which reported for 1894 gave a materially reduced output from that of the previous year. Some slight increase is shown from Bridgeport and a large one from Connor Creek. The small mines around Express produced about the same as in 1893. Only one mine reported from McEwens in 1893, but several give returns amounting to $14,000 for 1894. The Rye Valley mines show a reduced output of some $4,000 from that of the previous year, and those of Sumpter a reduction of about $3,000. The mines at Weatherby show an increase of some $20,000 over yield of previous year.

From Benton County there were no reports received in 1893, but the Beach mines return $2,045 for 1894.

Coos County shows an increase of over $100,000, mainly from the Salmon Mountain placers.

From Crook County there is a very small yield, but it is more than that of the previous year. The yield of Curry County is about $6,000 less than that of 1893. From Clackamas County, which gave a yield of $1,000 in 1893, no returns were received for last year.

Douglas County, which returned $16,760.85 in 1893, shows a yield of $70,879.38 in 1894. This increase comes from the mines at Canyonville, Glendale, Roseburg, and Starvout.

From Grant County the returns of 1893 were $198,650, while in 1894 the returns were $129,853, the loss being mainly from mines around Granite.

Harney County, which did not appear among the bullion-producing counties in 1893, returns $1,500 in 1894.

The returns from Jackson County are almost exactly the same as in 1893, $107,000.

There is very little difference in the returns from Josephine County in the two years, the yield of 1894 exceeding the previous year by about $10,000.

In Lane County the yield is $24,500 less than the previous year, the mines at Cottage Grove not having been so productive as in 1893.

Linn County shows an increase of less than $1,000, the total being only $5,000.

Malheur County, which gave returns of $29,645 in 1893, only shows a yield of $13,000 for 1894.

Marion County has a nominal product of $985 and did not appear in the returns for 1893.

Union County gives returns for 1894 of $1,059,070 gold and $8,100 silver, a total of $1,067,170. In 1893 the total was $423,283.30, including $3,046.42 silver. The returns are therefore a good deal more than double those of 1893. This increase came from the mines at Cornucopia, Sanger, and Sparta. The returns from these districts were very full and complete, some of the citizens there interesting themselves in obtaining the figures of the product from all the mines. As a result Union County shows the largest yield for 1894 of any county in Oregon, and even more than double that of Baker County, which has usually headed the list. As previously stated, many companies in Baker County failed to make returns this year, and the list of bullion producers was not so large as in 1893, when citizens of Baker City interested themselves in obtaining returns from those companies which made no response to printed inquiries. Thirteen large mines reported from Cornucopia, Union County, this year as against six in 1893; and thirty reported from Sparta as against twenty in 1893, while there were also several added to the list at Sanger. Most of the producers also increased their yield in 1894. The returns from Union County make up about half of the total product of the State for 1894.

RECAPITULATION BY COUNTIES.

Counties.	Gold.	Silver.	Total.
Baker	$447, 995. 72	$2, 251. 00	$450, 246. 72
Benton	2, 045. 00	....	2, 045. 00
Coos	109, 353. 77	....	109, 353. 77
Crook	1, 050. 00	....	1, 050. 00
Curry	8, 800. 00	....	8, 800. 00
Douglas	70, 879. 38	....	70, 879. 38
Grant	129, 853. 06	....	129, 853. 06
Harney	1, 500. 00	....	1, 500. 00
Jackson	107, 647. 00	....	107, 647. 00
Josephine	123, 676. 61	....	123, 676. 61
Lane	32, 500. 00	....	32, 500. 00
Linn	5, 000. 00	....	5, 000. 00
Malheur	13, 000. 00	....	13, 000. 00
Marion	985. 88	....	985. 88
Union	1, 059, 070. 00	8, 100. 00	1, 067, 170. 00
Total	2, 113, 356. 42	10, 351. 00	2, 123, 707. 42

X

SOUTH APPALACHIAN STATES.

By W. E. Ardrey,

Assayer in charge of the United States Assay Office at Charlotte, N. C.

The precious-metal mines of the South Appalachian Range yielded, in coining value, in 1894 as follows:

Gold, $258,117.84; silver, $5,709.82; total, $263,827.66; against a total for 1893 of $311,788.73.

Of this amount of silver $4,300, in round numbers, was the production of one silver mine in North Carolina, the balance being due to the incidental silver contents of the gold bullion.

The output of Maryland, Virginia, and Tennessee was slightly increased; North Carolina, South Carolina, Georgia, and Alabama gave smaller returns than in 1893.

No copper or lead ores containing gold and silver are known to have been treated, with the exception of the silver-lead ores from the Silver Valley mine, Davidson County, N. C., which were smelted at Thomasville in February and March. The product was sent from the State in the form of matte. Some other small lots of gold ores were sent from this section for test runs or for smelting.

MARYLAND.

The total production of this State was:

	Ounces, fine.	Coining value.
Gold	47.228	$976.28
Silver	1.69	2.19
Total	48.918	978.47

This was almost entirely obtained from the vicinity of the Potomac and Montgomery mines, in Montgomery County; and no regular mining operations, so far as could be learned, were carried on.

No statement is possible regarding the work to be done in 1895.

VIRGINIA.

The little mining work accomplished was chiefly at the Powhatan mine, in Culpeper County, and at the Rappahannock and Leopold mines.

The gold obtained from the petty work along the gold belt in Stafford, Fauquier, Culpeper, Orange, Spottsylvania, Louisa, Goochland, and Fluvanna counties found its outlet in such a way as to elude classification.

It is probable that more work will be done in 1895, as there is evidently more attention given to this section at present, but no reliable forecast of production is possible.

The important statistics, arranged by counties, are as follows:

PRODUCTION OF VIRGINIA, BY COUNTIES, 1894.

Counties.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Coining value.	
Culpeper	93.748	$1,937.95	3.48	$4.50	$1,942.45
Goochland	93.076	1,924.06	4.77	6.17	1,930.23
Stafford and Spottsylvania	46.182	954.66	2.34	3.02	957.68
Miscellaneous	135.641	2,803.95	6.43	8.31	2,812.26
Total	368.647	7,620.62	17.02	22.00	7,642.62

NORTH CAROLINA.

The diminished yield in 1894 was due to the fact that the Thomasville works and the Silver Valley mine had but a brief campaign in the spring, and to a cessation of work at two of the larger mines (all due to financial difficulties at headquarters), and a diversion of the labor of placer miners to the extraction of monazite from the old washings and the débris which for a long period have been accumulating.

There is no present appearance that the above-mentioned financial difficulties are likely to be overcome; and so long as the present price of monazite, or an approximation to it, prevails, the greater profit in its mining will probably continue to divert that part of the population which has for three or four generations given its attention to the gold industry.

An overstocking of the market for this rare mineral, which has twice occurred in the last few years, and which was recently threatened, may cause a larger number of miners to apply themselves to their old occupation, with a consequent increase of production of the precious metals; on the contrary, any considerable increase in the use of incandescent lighting, or any extension of the use of this mineral in the arts, with consequent enhanced demand, may make this industry even more profitable, and cause a well-nigh total neglect of placer work. It may be added that there has recently been a European demand of some importance; nevertheless the present presumption is that the price will decline.

This monazite has been found in quite unexpected places, and over a much greater extent of territory than had been supposed. The most important productive areas are in the South Mountain district of Burke, McDowell, and Rutherford counties, and in its extension in Polk County and in Jackson County.

There was less effort to introduce patent machinery and processes the last year, and far less disposition to engage in speculative mining.

The depressed condition of agriculture and of business generally led a larger number of people to engage in petty work, and more will be done in 1895.

The condition of work and the prospects for 1895 in Burke, McDowell, Rutherford, Polk, and Cherokee counties has been sufficiently indicated in the prefatory remarks on the monazite industry, but more gold mining is likely to be carried on in Cherokee County under any circumstances.

A summary by counties is herewith given:

Franklin County.—The Portis and Mann-Arrington were the only mines at work.

Person and Granville counties.—No information was elicited respecting any work in this copper-mining section.

Caldwell, Guilford, and Lincoln counties.—Nothing of importance was accomplished in these counties, nor is there likely to be anything of importance done in 1895, so far as our present information goes.

Catawba County.—The England and the Shuford mines have considerably increased the output of this county.

Randolph County.—The Hoover Hill mine was practically idle, and the other operations in the county added but a small amount to the total output of the State.

The greatest item of decrease (which accounts for nearly the whole of the shrinkage of the State in 1894) was due to the cessation of work in this county.

The Jones or Keystone and the near-by Sawyer were reopened in the autumn, and from the well-known resources of these mines a considerable output may be expected.

Other mines—the Buckeye and the Redding—are likely to be at work in 1895.

Davidson County.—The operations at the Thomasville works, as already mentioned, were greatly abridged, and nothing beyond this work was accomplished in 1894.

Rowan County.—The production of this county was materially increased. The only mines regularly at work are the Bame and the Gold Hill. It is possible that the recently reopened Rhymer mine, with its connected chlorination plant, may be in operation in 1895; otherwise there is no ground for expecting a larger return from this county.

Cabarrus County.—The production was more than doubled in 1894, though no new mines were at work. The Rocky River mine is the only mine now in process of reopening.

Stanly, Moore, Union, Montgomery, and Gaston counties.—There was no change in the character of work in 1894 beyond some increase in the amount of petty mining.

The Columbia (Burns-Alred) mine, in Moore County, may be on the list of producers in 1895.

Mecklenburg County.—There is no material change to record, and, with the exception of the Faires mine, which will afford a fine grade of smelting ore, no new mine was placed on the list of producers.

More work will probably be done in 1895.

No confident statement can now (January, 1895) be made of any large improvements for the current year.

PRODUCTION OF NORTH CAROLINA, BY COUNTIES, IN 1894.

County.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Coining value.	
Burke	276.357	$5,712.80	51.21	$66.21	$5,779.01
Cabarrus	417.361	8,627.63	41.68	53.89	8,681.52
Caldwell	22.792	471.15	2.68	3.47	474.62
Catawba	100.732	2,082.30	23.34	30.17	2,112.47
Cherokee	77.660	1,605.38	6.77	8.75	1,614.13
Davidson	13.595	281.04	3,311.93	4,282.09	4,563.13
Franklin	95.201	1,967.98	4.76	6.15	1,974.13
Gaston	42.633	881.31	3.74	4.84	886.15
Guilford	9.665	199.80	1.49	1.92	201.72
Lincoln	7.580	156.69	.31	.40	157.09
McDowell	27.232	562.95	7.47	9.66	572.61
Mecklenburg	244.223	5,048.54	25.39	32.83	5,081.37
Montgomery	81.585	1,686.51	23.52	30.40	1,716.91
Moore	57.142	1,181.23	30.73	39.73	1,220.96
Polk	9.367	193.64	1.20	1.56	195.20
Randolph	85.242	1,762.11	23.58	30.48	1,792.59
Rowan	293.309	6,063.23	44.05	56.96	6,120,19
Rutherford	78.079	1,614.02	7.13	9.22	1,623.24
Stanly	158.910	3,284.96	13.71	17.73	3,302.69
Union	87.636	1,811.60	38.54	49.83	1,861.43
Miscellaneous	143.760	2,971.77	18.52	23.95	2,995.72
Total	2,330.061	48,166.64	3,681.75	4,760.24	52,926.88

SOUTH CAROLINA.

The statements of 1893 will apply with unimportant changes to 1894, with two exceptions, viz, the Blacksburg Calorie Reduction Company accomplished some work toward the end of the year, and the Brewer mine, in Chesterfield County, was idle nearly ten months. It is believed that internal disagreements in the company were the cause of suspension, for there has been no question raised as to the great resources of the property. The suspension of this mine fully accounts for the diminished yield of the State, and its resumption will restore the State to its former leading position.

The Haile mine, in Lancaster County, still maintains its energetic and productive work, and each year witnesses some marked improvement in the methods, which inures not only to its own advantage, but to the profit of the whole section, and has an important bearing on the solution of the problems of the gold industry.

On the whole, the mining operations in this State are in a satisfactory condition and are likely to be extended in a conservative manner.

PRODUCTION OF SOUTH CAROLINA, BY COUNTIES, IN 1894.

Counties.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Coining value.	
Chesterfield	310.775	$6,424.29	19.23	$24.87	$6,449.16
Lancaster	3,812.531	78,812.02	156.99	202.98	79,015.00
Spartanburg	59.484	1,229.64	35.99	46.53	1,276.17
Union	473.355	9,785.13	75.93	98.18	9,883.31
York	62.287	1,287.60	8.50	10.98	1,298.58
Miscellaneous	40.031	827.51	10.63	13.74	841.25
Total	4,758.463	98,366.19	307.27	397.28	98,763.47

GEORGIA.

The output for 1894 was within a few hundred dollars the same as in 1893. The conditions of work are favorable for steady operations and some increase of yield.

The bulk of the production still comes from Cherokee, Lumpkin, White, and McDuffie counties.

Rabun, Habersham, Union, Cobb, Milton, Forsythe, Hall, Lincoln, Haralson, and Meriwether counties may be briefly alluded to. No systematic work was attempted in 1894, nor can anything be learned of regular mining work likely to be attempted in 1895. The placer work and petty mining operations in these counties and in the entire mining section of Georgia is likely to be greater in 1895, if the present unfavorable condition of agriculture and the low prices of the staples of this section should prevail.

White County.—The production was greater in 1894, but the conditions did not vary materially from 1893, nor is there at present any likelihood of marked change in 1895.

McDuffie County.—Four mines were in operation in 1894: The Parks, Latham, Egypt, and Columbia. The production was considerably greater than in 1893, and will probably be greater still in 1895, as the chief producer—the Parks—will have a larger plant.

Lumpkin County.—This county continues to be the largest producer in Georgia. There has been some extension of mining work and a few new properties have been taken in hand and partly opened up. The statement for 1893 and the enumeration of the mines at work are applicable to 1894.

More attention will be given to the question of sulphurets and refractory ores in general, and apparently some progress was made toward a solution of that troublesome problem.

The placer work about Auraria and Newbridge was extended, and bids fair to increase.

Cherokee County.—Much the greater part of the production of this county was from the Creighton mine, though the Charles mine, and several localities about Canton, gave small returns. The Creighton is now in full and steady operation; its chlorination plant adds largely to its output and appears to have much more than made good the old cyanide plant.

The conditions of the work are sufficiently settled to justify a considerably larger output in 1895.

PRODUCTION OF GEORGIA, BY COUNTIES, 1894.

Counties.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Coining value.	
Carroll	104.292	$2,155.90	1.27	$1.64	$2,157.54
Cherokee	946.259	19,560.90	20.70	26.76	19,587.66
Cobb	37.008	765.03	1.04	1.35	766.38
Dawson	154.926	3,202.61	5.29	6.84	3,209.45
Forsyth	4.319	89.28	.11	.14	89.42
Habersham	4.236	87.57	.91	1.18	88.75
Haralson	12.524	258.88	4.19	5.41	264.29
Lumpkin	1,616.064	33,407.02	111.11	143.64	33,550.66
McDuffie	875.196	18,091.91	102.74	132.83	18,224.74
Meriwether	3.860	79.80			79.80
Milton	8.736	180.58	.24	.32	180.90
Rabun	73.900	1,527.63			1,527.63
Union	46.744	966.30	.39	.50	966.80
White	719.678	14,877.06	60.04	77.62	14,954.68
Wilkes	68.655	1,419.22	25.39	32.83	1,452.05
Miscellaneous	95.875	1,981.92	9.16	11.85	1,993.77
Total	4,772.272	98,651.61	342.58	442.91	99,094.52

ALABAMA.

Tallapoosa County.—In this county the Blue Hill, Gregory Hill, Susanna, Farrow, and Cooper Creek mines were at work during part of the year, but the deficient water supply cut the operations short in the summer and autumn.

Cleburne County.—The Lucky Joe was the only mine worked in this county, but considerable placer work was carried out in the mines around Arbacoochee. There were no indications at the beginning of 1895 of any extension of the work.

The following table shows the amount of gold and silver mined in 1894:

PRODUCTION OF ALABAMA, BY COUNTIES, 1894.

Counties.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Coining value.	
Cleburne	27.360	$565.58	7.55	$9.76	$575.34
Tallapoosa	90.759	1,876.14	37.14	48.02	1,924.16
Miscellaneous	75.730	1,565.49	21.20	27.42	1,592.91
Total	193.849	4,007.21	65.89	85.20	4,092.41

TENNESSEE.

Operations were entirely confined to the vicinity of Coker Creek, and the amount obtained was as follows:

PRODUCTION OF TENNESSEE IN 1894.

County.	Gold.	
	Ounces, fine.	Value.
Monroe	15.930	$329.29

NOTE.—No silver reported.

SUMMARY OF PRODUCTION OF GOLD AND SILVER IN THE SOUTH APPALACHIAN STATES IN 1894.

State.	Gold.		Silver.		Total value.
	Ounces, fine.	Value.	Ounces, fine.	Coining value.	
Maryland	47.228	$976.28	1.69	$2.19	$978.47
Virginia	368.647	7,620.62	17.02	22.00	7,642.62
North Carolina	2,330.061	48,166.64	3,681.75	4,760.24	52,926.88
South Carolina	4,758.463	98,366.19	307.27	397.28	98,763.47
Georgia	4,772.272	98,651.61	342.58	442.91	99,094.52
Alabama	193.849	4,007.21	65.89	85.20	4,092.41
Tennessee	15.930	329.29	....	....	329.29
Total	12,486.450	258,117.84	4,416.20	5,709.82	263,827.66

XI

SOUTH DAKOTA.

By R. E. GRIMSHAW, *Deadwood, S. Dak.*

The close of the year 1894 shows a marked feeling of confidence in the Black Hills, as there have been many new discoveries of undoubted value. Prospecting has been more active this year than in the past, and in return for the increased activity there have been many rich discoveries. Among the new districts is Yellow Creek, about 4 miles south of Deadwood, where large bodies of refractory ores are already being worked with profit. Pennington County has attracted considerable attention the past few months, and valuable discoveries of free milling ore have been made.

Placer mining has been very active the past year, and the amount of gold produced exceeds that for many years previous. Many transfers of mining property have been made during the past few months.

The Horseshoe Mining Company, an English syndicate, has made a number of important purchases and intends building a large reduction works, and no doubt it will add largely to the production the coming season. On the whole, mining prospects are very encouraging, and I look for a larger production for 1895 than any previous year.

AMOUNT OF GOLD PRODUCED IN SOUTH DAKOTA IN 1894.

Mine.	Ounces, standard.	Coining value.
Homestake Mining Co	76, 001. 887	$1, 413, 988. 60
Deadwood Mining Co	9, 433. 588	175, 508. 61
Highland Mining Co	41, 704. 379	775, 895. 42
Golden Reward Mining Co	27, 785. 743	516, 944. 06
Deadwood and Delaware Smelting Co	11, 129. 032	207, 000. 00
South Dakota Mining Co	500. 000	9, 300. 00
R. B. Hayes Mining Co	18. 546	345. 00
Keystone Mining Co	3, 487. 634	64, 870. 00
Stanby Mining Co	2, 043. 010	38, 000. 00
Purchased by First National Bank, Deadwood	19, 462. 365	362, 000. 00
Unknown, purchased by United States Assay Office, New York	10, 801. 642	200, 960. 78
Purchased by other banks and bankers	4, 543. 010	84, 500. 00
Purchased by manufacturing jewelers	1, 002. 686	18, 650. 00
Total	207, 913. 524	3, 867, 962. 47

AMOUNT OF SILVER PRODUCED IN SOUTH DAKOTA IN 1894.

Mine.	Ounces, standard.	Coining value.
Homestake Mining Co	15, 261. 92	$17, 759. 33
Deadwood Mining Co	1, 958. 89	2, 279. 43
Highland Mining Co	8, 801. 06	10, 241. 23
Golden Reward Mining Co	174. 57	203. 14
R. B. Hayes Mining Co	3, 560. 00	4, 140. 28
Deadwood and Delaware Smelting Co	60, 000. 00	69, 780. 00
Unknown, purchased by United States Assay Office, New York	1, 638. 98	1, 907. 18
Total	91, 395. 42	106, 310. 59

XII

UTAH.

By A. HANAUER, *Salt Lake City, Utah.*

Utah's production of the precious metals for the year 1894 was 54,570 ounces of gold, of a value of $1,128,070, and 6,534,182 ounces of silver, of a coining value of $8,448,044, a total of $9,576,114.

Compared with the preceding year, this is a gain of 12,104 ounces of gold and 175,305 ounces of silver, an aggregate gain of $476,874.

No new districts were discovered during the year, nor have any new producers come to the front. Prospecting, notably in the gold-producing districts, is vigorously carried on, and it is safe to predict that the year 1895 will witness new producing districts and mines.

PRODUCT OF UTAH, BY COUNTIES, 1894.

Counties.	Gold.	Silver.
	Ounces.	*Ounces.*
Summit	4,451	2,802,289
Juab	18,066	2,582,033
Salt Lake	12,277	735,288
Tooele	19,566	112,608
Beaver		279,882
Washington		16,232
Shipments from counties not mentioned	210	5,850
Total	54,570	6,534,182

COMPARISON OF THE PRODUCT OF THE TERRITORY OF UTAH FOR CALENDAR YEARS 1893 AND 1894.

Year.	Gold.	Silver.
	Ounces.	*Ounces.*
1893	42,466	6,358,877
1894	54,570	6,534,182
Increase	12,104	175,305

NOTE.—Of the total output of Utah 24,979 ounces of gold and 4,452,438 ounces of silver were contained in smelting ores, and 29,591 ounces of gold and 2,081,744 ounces of silver were milled by various processes. The product of the placers is included in the latter item.

WELLS, FARGO & CO.'S STATEMENT OF THE MINERAL PRODUCT OF UTAH FOR 1894.

Source.	Copper.	Lead.		Silver.		Gold.	
		Refined.	Unrefined.	In bars.	In base bullion and ores.	In bars	In bullion and ores.
	Pounds.	*Pounds.*	*Pounds.*	*Ounces.*	*Ounces.*	*Ounces.*	*Ounces.*
Germania Lead Works	314, 626	202, 500	14, 458, 775	....	1, 358, 374	....	8, 127
Hanauer Smelting Works	490, 000	....	7, 175, 200	....	723, 550	....	3, 860
Pennsylvania Smelting Co.	162, 500	....	12, 851, 850	....	1, 108, 508	....	14. 350
Daly Mining Co	....	....	....	700, 000	4. 606	630	4
Ontario Mining Co	....	....	692, 598	1, 250, 000	85. 828	1. 100	93
Mercur district	....	....	....	....	....	16 014	....
Silver Reef district	37, 234	....	....	15, 802	430	....	....
Other mines and placers	61, 800	....	....	....	....	7. 882	....
Total.	1, 066. 160	202, 500	35, 178, 423	1, 965, 802	3, 281, 296	25 626	26. 434
Contents ore shipped	....	....	20, 373, 240	....	1, 412, 700	....	4, 367
Total	1, 066, 160	202, 500	55, 551, 663	1, 965, 802	4, 693, 996	25, 626	30, 801

RECAPITULATION.

Metal.	Quantity.	Unit of value.	Total value.
Copper .... pounds	1, 066, 160	5 cents per pound	$53, 308. 00
Refined lead .... do	202, 500	$3.11 per 100 pounds	62, 977 50
Unrefined lead .... tons	55, 551, 663	$32 per ton	888, 826. 00
Fine silver .... ounces	6, 659, 798	$0.6297 per ounce	4, 193, 674. 80
Fine gold .... do	56, 427	$20 per ounce	1, 128, 540. 00
Total export value	....	....	6, 327, 326. 90

NOTE.—Computing the gold and silver at their mint valuation, and other metals at their value at the seaboard, it would increase the value of the product to $11,631,402.72.

XIII

WASHINGTON.

By Charles G. Yale.

From returns received at the mint at San Francisco the product of gold and silver of Washington for the calendar year 1894 is shown to be as follows:

Gold	$232,761.27
Silver	12,520.09
Total	245,281.36

The production in 1893 was:

Gold	$223,394.37
Silver	174,494.55
Total	402,888.92

These figures show an increase of yield in 1894 over that of 1893 of $4,366.90 gold, and a decrease of $161,974.46 silver, a total decrease of $157,607.56.

This decrease, as will be noted, is entirely in the silver product. In common with other regions where silver mining is carried on the mining districts in Washington languished during 1894, as many properties were closed entirely, finding it impossible to work at a profit. Prospecting was discouraged to a certain extent, as many miners left for regions where more gold mining was going on.

Returns were received from ten counties in 1894, as against nine counties in 1893, as follows: Franklin County, with a yield of $10,000 from mines at Pasco, was not represented in the previous report; Kittitas County, with a yield of $91,549 in 1893, shows returns for 1894 of $72,000; in Lincoln County the small yield is increased by about $1,000; in Okanogan County there is upward of $42,000 loss in silver product and a gain of about $12,000 in gold product; in Skagit County the yield is practically the same as the previous year; in Snohomish County the yield for 1894 is $15,000, as compared with $3,000 the previous year; Spokane County, which showed a yield of $12,000 silver in 1893, made no returns this year; Stevens County shows a large falling off. Its yield in 1893 was $28,727.77 gold and $117,273.55 silver, while in 1894 the returns are $3,700 gold and $8,800 silver. Wallawalla County did not appear in the returns of 1893, and gives less than $1,000 gold this year; Whatcom County returns $31,300 gold for 1894, while the yield was only $1,500 in 1893; Whitman County, which returned $11,020 in 1893, shows a yield for 1894 of but $6,619.70.

New capital has not sought investment in the mines of Washington to any extent during the past year, and several of the larger mining enterprises have been nonproductive, mainly owing to the continued low price of silver.

RECAPITULATION BY COUNTIES.

Counties.	Gold.	Silver.	Total.
Franklin	$10,000.00		$10,000.00
Kittitas	72,200.00		72,200.00
Lincoln	5,789.57		5,789.57
Okanogan	21,602.00	$3,220.09	24,822.09
Skagit	79,600.00		79,600.00
Snohomish	1,000.00	500.00	1,500.00
Stevens	3,700.00	8,800.00	12,500.00
Wallawalla	950.00		950.00
Whatcom	31,300.00		31,300.00
Whitman	6,619.70		6,619.70
Total	232,761.27	12,520.09	245,281.36

PART II.

PRODUCTION OF GOLD AND SILVER IN FOREIGN COUNTRIES.

PRODUCTION OF GOLD AND SILVER IN FOREIGN COUNTRIES.

AFRICA.

SOUTH AFRICA.

Mr. Aubert, consul of France at Pretoria, has reported to the French department of foreign affairs that the production of the gold mines of the South African Republic amounted in 1894 to 2,265,853 ounces, distributed among the districts as follows:

	Ounces.
Witwatersrandt	2, 024, 164
De Kaap	92, 577
Lydenburg	60, 275
Klerksdorp and Potschefstroom	77, 714
Zoutpansberg	10, 629
Malmani	494
Total	2, 265, 853

Between Mr. Aubert's figure for the Witwatersrandt and that of the Johannesburg Chamber of Mines there is the insignificant difference of 5 crude ounces.

Several journals, in lieu of the above figures, have published the following as those of the minister of mines of the South African Republic:

District.	Ounces.	Value.
Witwatersrandt	1, 949, 939	£6, 718, 168
De Kaap	87, 483	298, 598
Klerksdorp	78, 358	264, 724
Lydenburg	60, 276	173, 275
Heidelburg	52, 685	172, 340
Zoutpansberg, etc	11, 134	40. 017
Grand total	2, 239, 875	7, 667, 152

These figures may be, as they purport to be, the official data of the minister of mines. This Bureau deems it preferable, however, to adopt provisionally, subject, if need be, to correction in the future, the data supplied by the French consul, Mr. Aubert, and by the Johannesburg Chamber of Mines. The mining companies of the South African Republic have always been reluctant to inform the Government of the amount of their gold output.

As remarked in the last report of this series, page 145:

> Previous to the year 1892 there were no official statistics of the South African Republic, and even for that year they are by no means complete, as a great many mining companies are only gradually, reluctantly, and under compulsion yielding to the requirements of the law to furnish the data of production.

This unwillingness of the mining companies to make returns of the yield of their mines to the Government would account for the difference in the output of the Witwatersrandt as given by Mr. Aubert and the Johannesburg Chamber of Mines, and those claimed, perhaps rightly, to be the official figures of the minister of mines of the South African Republic.

The difference between the value of the output given in them and that calculated and published in this report is explainable by the fact that the former value represents a lesser weight of metal, and by the further fact that the gold as reported in the Transvaal statistics is of lesser average fineness than .847½, up to which average degree it is estimated in the present report to have been refined. The refining, of course, enhances the commercial value of the metal.

It is a matter of regret that so much doubt exists as to the amount of fine gold produced in the Transvaal. While this Bureau, on the authority of Sir C. W. Fremantle, late deputy master of the royal mint, London, places the fine metal contained in the crude reported in the statistics of the Transvaal at .847½ fine, as high an authority as Herr Schmeisser (see his report given below) says:

> The statistics of the Transvaal give only crude gold, because the refining of the gold does not take place in the country itself. In order to obtain the figures for fine gold, from 10 to 13 per cent must be deducted from the crude gold.

This would make the crude gold as given in the statistics of the Republic contain from .870 to .900 fine, and raise the product of fine gold in 1894, even if the figures alleged to be official be accepted instead of those of the French consul, Mr. Aubert, to 2,015,877 ounces as a maximum and 1,948,682 ounces as a minimum, both of which are largely in excess of what it is estimated at here.

It will be seen that the question of the proper valuation of the gold product of the Transvaal is a difficult one.

This Bureau has received no report from the consular representatives of the United States in the South African Republic and none from the Transvaal Government on the gold output of the country in 1894. It therefore continues to estimate it on the basis of the figures supplied by the Johannesburg Chamber of Mines and by Mr. Aubert to his Government, at the same average fineness, and in all respects in accordance with the same method, as last year. The figures here given for 1894, however, are, in view of the apparent uncertainty of the fine metal contained in the crude, subject to correction in the light of whatever information on the subject may be obtained in the future.

As the average fineness of South African gold, as this Bureau ascertained last year from Sir C. W. Fremantle, then deputy master of the royal mint, London, is .847½, which makes its value $17.5194 per ounce, fine, the above product of 2,265,853 ounces, crude, represents 1,920,310 ounces, fine, of the value of $39,696,330, corresponding to a weight of 59,729.65 kilograms, fine.

This amount added to the gold product of the West Coast of Africa in 1894 gives the total African product for the year. The product of the West Coast is assumed to be equal to the amount of gold bullion exported by it to Great Britain during the year. The amount of these exports for 1894 was 30,326 ounces, .916⅔ fine, or 27,799 ounces, fine, of the value of $574,653, corresponding to 865 kilograms.

The total gold product of Africa in 1894 was, therefore, 1,948,109 ounces, fine, of the value of $40,271,000, representing 60,595 kilograms, at which figure it appears in the present report.

As the gold product of the West Coast in 1893 was only 34,286 ounces, crude, while it was assumed to have been the same as in 1892, i. e., 53,402 ounces, crude, of the value of $1,011,924, the total African production of 1893 has to be reduced by $362,229 and placed at $28,943,526.

WEST COAST OF AFRICA.

The figures given at the beginning of this article relate only to the gold product of the Transvaal, but may be taken to represent the output, not only of the South African Republic, but of the whole of Southern Africa, for the present yield of Natal and Cape Colony is insignificant, not amounting, probably, to 1,000 ounces of crude gold.

The gold yield of the West Coast, however, is worthy of more attention, as will be seen from the following table of the gold thence exported to Great Britain in the years named:

Table showing the Gold Imported into England from the West Coast of Africa during the Years 1889–1894.

Year.	Weight.		Value.	Kilograms.
	Ounces, standard (.916⅔).	Ounces, fine.		
1889	44,554	40,841.17	$844,262	1,270
1890	37,242	34,138.50	705,705	1,062
1891	45,212	41,444.33	856,730	1,289
1892	53,402	48,951.83	1,011,924	1,523
1893	34,286	31,429.00	649,695	977
1894	30,326	27,798.83	574,653	865

Adding the production of the Transvaal to the production of the West Coast of Africa thus obtained gives the following:

TABLE SHOWING THE TOTAL PRODUCTION OF GOLD IN AFRICA FOR THE YEARS 1889–1894.

Year.	South Africa.		West Coast.		Total.	
	Weight.	Value.	Weight.	Value.	Weight.	Value.
	Kilos.		*Kilos.*		*Kilos.*	
1889	11, 719	$7, 788, 372	1, 270	$844, 262	12, 989	$8, 632, 634
1890	15, 706	10. 438, 356	1, 062	705, 705	16, 768	11, 144, 061
1891	22, 398	14, 885, 639	1, 289	856, 730	23, 687	15, 742, 369
1892	34, 938	23, 220. 108	1, 523	1, 011. 924	36, 461	24, 232, 032
1893	42, 573	28, 293, 831	977	649, 695	43, 550	28, 943, 526
1894	59, 730	39, 696, 330	865	574. 653	60, 595	40, 270, 983

The following table, showing the monthly returns of the gold yield of the Witwatersrandt for the past five years, as supplied by the Johannesburg Chamber of Mines, is taken from the London Economist of January 12, 1895:

RAND GOLD PRODUCTION, 1890–1894.

Month.	1890.	1891.	1892.	1893.	1894.
	Ounces.	*Ounces.*	*Ounces.*	*Ounces.*	*Ounces.*
January	35, 030	53, 205	84, 569	108, 374	149, 814
February	36, 886	50, 079	86, 640	93, 252	151, 870
March	37, 680	52, 949	93, 244	111, 474	165, 372
April	38, 799	56, 372	95, 562	112, 053	168, 745
May	38, 884	54, 673	99, 436	116, 911	169, 773
June	37, 412	55, 864	103, 252	122. 907	168, 162
July	39, 452	54, 924	101, 280	126, 169	167, 953
August	42, 861	59, 070	102, 322	136, 069	174, 977
September	45, 467	65, 602	107, 852	129. 585	176, 707
October	45, 251	72, 793	112, 167	136. 682	173, 378
November	46, 795	73, 794	106, 795	138, 640	175, 304
December	50, 352	80, 313	117, 749	146, 357	182, 104
Total	494, 869	729, 638	1, 210, 868	1, 478, 473	[1] 2, 024, 159

[1] It will be noticed that there is the insignificant difference of 5 ounces between this amount and that given by Mr. Aubert.

The following table also taken from the London Economist shows the monthly returns in 1894 of the Rand mines from milling operations, from concentrates, and from tailings, with the yield per ton of ore dealt with:

Month.	Mill returns.			Concentrates.		Tailings.	
	Tons.	Ounces.	Pennyweights (per ton).	Tons.	Ounces.	Ounces.	Pennyweights (per ton).
January	217,971	99,723	9.15	169,354	5 331	39,889	4.56
February	205,566	100,109	9.72	178,592	6,455	41 269	4.55
March	236,385	110,059	9.31	204,421	5,977	44.664	4.37
April	237,213	111,715	9.41	211,764	5,618	47.147	4.42
May	243,217	109,237	8.98	228,291	6,230	49,144	4.36
June	229,888	108,008	9 34	220,507	7,032	48,800	4.42
July	242,173	108,680	8.95	226.626	7,258	48.241	4.25
August	248,213	109,951	8 85	248,534	7,046	53.926	4.33
September	240.548	112,640	9.33	243,502	7 000	52,527	4.28
October	243,165	108,803	8.95	256,884	8 106	53,631	4.15
November	238,377	110,480	9.27	250,108	7,869	54,898	4.37
December	244,649	116,003	9.48	236,090	10,657	53,252	4.51
Total	2,827,365	1,305,408	9.23	2,674,673	84,579	587,388	4.39

The total number of ounces obtained from milling, concentrates, and tailings in 1894 was, according to the above table, 1,977,375, while the total product of the year was 2,024,159 ounces. The Economist gives no explanation of this discrepancy, but continues:

> It will be seen from this that the aggregate production of the precious metal last year amounted to 2,035,970 ounces [?], and, compared with 1,478,477 ounces in the preceding year, shows an increase in 1894 of 557,493 ounces, or about 37 per cent. Taking the gold obtained from the milling and tailings at 70 shillings per ounce and from the concentrates at 60 shillings, where the actual receipts have not been specified by the individual companies, the aggregate production is valued at £6,963,100, against £5,187,206 in 1893, an increase of £1,775,894. Such an expansion as these figures exhibit is of course sufficient proof that the industry has been making very substantial progress, though, as we shall see, the increased production was largely due to the much greater quantity of tailings dealt with during the year.
>
> In the early days of the industry, before the MacArthur-Forrest and other processes were brought into play, the tailings were left over for subsequent treatment, but in many instances the accumulations have been practically worked off, so that in future only the current débris will be available. In 1892 the yield of gold from the tailings was 160,169 ounces; in 1893 it had risen to 304,498 ounces, and last year it amounted to 587,388 ounces. The tonnage of tailings dealt with was not completely recorded for 1893, but a careful estimate by the Chamber of Mines statistician places the amount for that year at 1,217,792 tons; last year it was 2,674,673 tons, or over double the total of 1893.

The following table compares the totals for last year with those of the preceding twelve months:

Production.	1893.	1894.
Ore milled........tons..	2, 203, 704	2, 827, 365
Gold produced........ounces..	1, 056, 385	1, 305, 408
Yield per ton........pennyweights..	9. 55	9. 23
Concentrates........ounces..	62, 737	84, 579
Tailings........tons..	1, 217, 792	2, 674, 673
Gold produced........ounces..	304, 498	587, 388
Yield per ton........pennyweights..	5. 00	4. 39
Other sources........ounces..	54, 859	[1] 58, 595

[1] By adding these 58,595 ounces "from other sources" to the 1,977,375 ounces obtained in 1894 from milling, concentrates, and tailings a total product last year of 2,035,970 ounces is obtained, or 11,806 ounces more than given in the table of gold production of the Transvaal in the years 1890-1894. The difference may possibly be accounted for by assuming that tailings remaining over from the previous year were treated in 1894.

In the quantity of ore milled there was an increase of 623,661 tons, or a little over 28 per cent, while the yield of gold increased 249,025 ounces, or about 23½ per cent, the average gold content having fallen about a third of a pennyweight per ton. Concentrates gave 21,842 ounces, or about 35 per cent more, while, with an increase of 1,456,881 tons of tailings treated, the production of precious metal increased 282,890 ounces, the decline in the rate of yield in this item being over half a pennyweight to the ton. Taking the milling results and those from the tailings together, the average rate of production for the year was 13.62 pennyweights per ton, against 14.55 pennyweights in the preceding year. In other words, while the tonnage of ore and tailings dealt with increased to the extent of about 63 per cent the yield of the precious metal, as we have seen, was augmented about 37 per cent.

In 1892 the average number of stamps at work was 1,907; in the following year the average rose to 1, 955, and last year it varied from 2,169 in January to 2,375 in April, the December total being 2,290, and the average rather over 2,300.

In the last report of this Bureau on the production of gold and silver the following language was used:

> This Bureau has been hitherto compelled to obtain its data of the gold product of South Africa from the most reliable sources available. Only once has it been able to publish figures furnished by a United States representative, when Mr. George F. Hollis, United States consul at Cape Town, supplied it with those of the Transvaal gold production for 1889.
>
> In the future efforts will be made to have the United States consular agent at Johannesburg send the Bureau an annual report of the production of the precious metals in the South African Republic, based on data obtained directly from the Transvaal Government. A beginning has already been made in this direction.

The official figures of the gold product of the Transvaal came for 1893, but too late for insertion in the last report of this series. It is therefore published here.

GOLD FIELDS OF SOUTH AFRICA IN 1893.

[By C. H. Benedict, United States consul at Cape Town, April 11, 1894.]

In reply to the Department's request for a full statement as to the gold yield in the South African Republic for certain years, an estimate as to its fineness, and such facts as I could gather in regard to all the gold fields of South Africa, I beg leave to submit the following:

Acting Consular Agent Charles Williams, at Johannesburg, has furnished me with a very full report, which I reproduce entire, and add such other facts as I have gathered:

Under date of March 13 Mr. Williams writes:

"The production for 1893 has continued to be progressive, and shows a considerable advance on that of the preceding year. Since the opening of the Witwatersrandt district fields the production has amounted to 4,556,235 ounces 12 pennyweights, as follows:

Year.	Quantity.	
	Ounces.	*dwt.*
1887	23,125	8
1888	208,121	14
1889	[1]369,557 42,000	5 0
1890	494,817	0
1891	729,268	6
1892	1,210,868	16
1893	1,478,477	3
Total Witwatersrandt district	4,556,235	12
All other districts	500,000	0
Grand total	5,056,235	12

[1] Estimated production in 1887, 1888, and 1889, of which no detailed record is now obtainable.

"The increase of 267,601 ounces 7 pennyweights on the output of 1892 in the Witwatersrandt district is due to the general development of the industry. The chief advance was obtained from the greater amount of tailings treated. The returns of tonnage of tailings, though detailed by most companies, are not complete, owing to a great extent to there being several small tailing syndicates which do not furnish particulars of their operations. A careful estimate, however, shows that 1,217,792 tons were dealt with during the year, or only 1,000,000 tons less than passed through the mills. The increase of output under this head was 144,329 ounces 17 pennyweights.

"Milling returns gave an increase of 83,091 ounces 11 pennyweights. The number of stamps worked during the several months has varied considerably, but the average running daily only exceeded that of 1892 by 48, the figures being: Average number of stamps per day running during 1892, 1,907; in 1893, 1,955. Owing, however, to stamps of heavier weight in many cases having been substituted for the lighter ones previously in use, the service per stamp was increased from 3.21 tons per day in 1892 to 3.65 tons in 1893, and an increase of tonnage treated of 282,444.

"The return per ton from the mills shows a slight decrease. This is due to most of the companies having reached the level of the pyritic rock. The actual total return from mills and tailings is, however, more than a pennyweight higher than that of 1892.

"Gold returned to the bank yielded 17,772 ounces 15 pennyweights more than in 1892. Under this head is comprised gold obtained by companies and syndicates working in the district but not making regular returns.

"As details are wanting, it is not possible to determine the relative amounts yielded by ore treated at the mills and tailings dealt with under this head, but a considerable proportion was undoubtedly obtained by milling operations.

"The following is the summary of increase during 1893:

Source.	Quantity.	
	Ounces.	*dwt.*
Mills	83,091	11
Tailings	144,329	11
Concentrates	22,378	17
Alluvial	35	13
From bank	17,772	15
Total	267,608	7

"The gold output of other districts of the Transvaal also shows an increase. The greatest progress has been made in the Klerksdorp and Potchefstroom districts; but Lydenburg and De Kaap have also advanced. Zoutpansberg, the chief producing center of which is Klein Letaba, which gives three-fourths of the whole of the gold output of the district, shows a decrease of nearly 40 per cent on the results of 1892. The last quarter of the year, however, shows a marked improvement on the previous ones. Malmani also shows a decrease of 15 per cent.

"The total output of gold in the Transvaal during 1893 was 1,610,335 ounces 18 pennyweights, as follows:

District.			Quantity.	
			Ounces.	*dwt.*
Witwatersrandt			1,478,477	3
De Kaap			67,497	7
Lydenburg			29,329	0
Klerksdorp and Potchefstrom			24,407	0
	Oz.	*dwt.*		
Klein Letaba	6,587	17		
Selate, etc	2,295	13		
			8,884	10
Malmani			1,719	8
Vryheid			21	10
Total			1,610,335	18

"There were exported from the Witwatersrandt by the different banks 1,437,607.9 ounces of native gold in 1893.

"The exports of raw gold from South Africa (Cape Colony and Natal) for 1893 amounted to 1,551,844 ounces, valued at £5,472,997. Thus the average price on all gold exported during the year 1893 was £3 10s. 6.4d. per ounce, and the bank assayers here compute the fineness at this price to be .830. This average of £3 10s. 6.4d., however, represents a liberal range of valuation, the general average value of the cyanide product being about £3 per ounce, while the general average value of the mill and concentrates gold is about £3 13s. 11d.

"The stamping capacity of these fields is being continually increased. There are about 250 stamps now in course of erection that will be started within the next three months.

"A proof that a constant increase may be expected in the output is given by the returns of January and February, 1894, the Witwatersrandt producing for these months 149,814 ounces and 151,857 ounces, respectively; and it is believed that 200,000 ounces per month will be reached before the end of this year.

"A large yield will also be derived later from the "deep levels" which thus far have only been started, but sufficient work has been done to prove the existence of a very rich deposit that probably will not reach the limit of its yield for four or five years.

"The maximum of production for these fields is believed to be about 300,000 ounces per month. While the opinions of experts vary on this point, the figure named represents about an average of the opinions given.

"Regarding Mashonaland and Matabeleland, it is clearly proven that these countries are very rich in gold, but there has not been a time since the whites have had free access to the country for sufficient work to give any returns in product. The largest operators of this country, however, are now arranging for the development of those fields."

In order to gain still further light on the question of the fineness of Witwatersrandt gold I applied to the Standard Bank of South Africa, which has a large branch at Johannesburg, and which claims to purchase nearly one-half of the gold output of these fields. The reply was as follows:

"With reference to the information which you verbally solicited as to the average fineness of the gold produced on the Witwatersrandt fields our Johannesburg branch supplies us with the following figures, based upon their purchases of gold for the six months ending December 31 last, and which they consider reflects a very fair average of the fineness of Witwatersrandt gold generally, viz, 38,583 ounces mill gold, .861 per cent; 13,238 ounces cyanide gold, .7195 per cent; average, .8255 per cent. The London value at .8255 per cent would be £3 10s. 1½d."

The difference of the estimate in fineness between Mr. Williams and the bank may be accounted for by reason of the large quantity of cyanide gold purchased by the bank and included in their estimate.

While it is yet too early to obtain statistics as to Mashonaland and Matabeland, there is no possible doubt the entire country as far north as the Zambesi River is very rich in gold, both alluvial and quartz reef. Some American prospectors who have passed a long time in the extreme north tell me that from Beira (on the East Coast) inland to Salisbury at least, and for a long distance north, there are unmistakable indications of extensive mining having been done centuries ago, and some old reefs have been worked to water level by open work. In other places old shafts are still to be seen.

The Manica country, nearer the coast, also seems to be rich in gold. A railroad is now being built from Beira to Salisbury, a distance of 350 miles, 75 miles of which have been completed. Buluwayo, the capital of the late Matabele king, is about 150 miles southwest of Salisbury. It is generally believed that the Portuguese formerly obtained large quantities of gold north of the Zambesi River, which is about 2,000 miles north of this place. The best informed scientists claim that Beira is the Ophir of the Bible.

Sir John Willoughby telegraphed from Buluwayo on March 17 that 4,042 mining claims had been registered up to that date; that excessively rich specimens were being continually sent in from every direction, and that none of the numerous pannings had given a prospect of less than 2 ounces.

The late newspapers here report the finding of rich alluvial deposits in Mashonaland, near Victoria. I inclose a clipping from the Cape Times, of this place, of March 8. A great many citizens of the United States are going into these fields. Every steamer brings a number of them to this port.

As to gold in Cape Colony and Natal, I have not been able to discover that it exists in quantities large enough to cut any figure in the gold markets. Small discoveries have been made, and some gold obtained, but not much.

Damaraland, a German possession on the West Coast, is probably rich in gold, but has scarcely yet been opened. Gold has been found near the coast, and indications are that the country will prove as rich as those farther inland.

In conclusion, I have no doubt that the opening of the railroad from Beira to Salisbury, the destruction of the Matabele power, and the influx of determined and experienced miners, now beginning to take place from our own country and from Australia, will, in a short time, very largely increase the gold output.

It will be noticed that there is a slight difference between the figures given by Consul Benedict of the total gold product of the South African Republic in 1893, viz, 1,691,335 ounces 18 pennyweights, and that published by the Bureau in last year's report (1,615,000 ounces).

The following is from the work of Herr Schmeisser, *Ueber Vorkommen und Gewinnung der nutzbaren Mineralien in der Südafrikanischen Republik*, Berlin, 1894. The concluding part, on the future of the mining industry of the Transvaal, especially on the permanence of its gold production, is, however, taken from an exhibit laid by him before the German Silver Commission, which met in Berlin on the 22d of February, 1894. It is substantially the same as the concluding subdivision of the above-named work.

MINERAL PRODUCTION OF THE TRANSVAAL.

HISTORICAL DEVELOPMENT.

In the territory of the South African Republic mining has been carried on by the natives for many years. Although abandoned in the Palabora Mountains, mining is still continued by the natives in the more northern parts of the Zoutpansberg district. It is limited, however, to the supply of materials for the most necessary articles of use and ornamentation of the native negroes. The iron and copper ores, taken in the simplest manner from the outcrop of the deposits, are melted in earthen ovens. These ovens, a few feet high, have a rectangular or round cross section, and on one side an earthen tuyere, which is supplied with air by means of a pair of bellows made of hides. The iron thus produced is worked into assegai heads and arrowheads, battle-axes, daggers, and picks, and the melted copper into rings, which the negro women wear around the neck or around the arms and legs, six to eight pieces, one above the other.

Although numerous old shafts, smelting furnaces, crucibles, and casting molds found in the ruined city of Zimbabye,[1] in Mashonaland, 311 miles north of the Transvaal, bear witness that mining for gold was carried on there at an early period, so that some are inclined to believe that the celebrated Ophir mine, whence the Queen of Sheba and King Solomon secured their gold, was situated there, there are no indications that the knowledge of the occurrence of gold in the Transvaal proper reaches further back than forty years.

The Boers, after settling in the Transvaal, occupied themselves with stock raising and agriculture. The idea of improving their condition by utilizing the mineral treasures of the country did not occur to them, and was repugnant to their nature.

When, therefore, the Boer, Marais, who had been in Australia and there learned the modes of occurrence of the yellow metal, found in 1854 traces of gold in the sands of the Yokeskey River, in the district of Pretoria, the Government published a decree prohibiting gold prospecting under heavy penalties. It feared that the thirst for gold would cause a great influx of foreigners into the country, and thus endanger its independence. This short-sighted policy could not be long maintained.

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[1] Theodore Bent: The Ruined Cities of Mashonaland; being a record of excavation and exploration in 1891; with a chapter on orientation and mensuration of the temples by R. M. W. Swan.

The rich mineral resources of the Transvaal could not be hidden. Logegary, a French missionary, traveled through the northern part of the Transvaal in 1858 in search of thieves who had stolen money and horses from him, and wrote at Sechelis, in October of that year, a letter to the secretary of state of the Republic, reporting that he had collected samples of quartz containing gold.

Fritsch traveled through Cape Colony and the Transvaal in the years 1863 to 1866 and found auriferous quartz.

Karl Mauch discovered in 1867, while on his exploring trip through Southern Africa, gold deposits to the north of the Limpopo, in Mashonaland, and on the Tati River, in Matabeleland, and in 1868 in the Transvaal itself, in the double chain of hills north of the Selati.

The discovery of gold on the Tati led to the formation of a company in London which sent engineers and machinery to work the deposits, and although the enterprise proved a pecuniary loss, which led to the dissolution of the company, the indications that there must be more gold beds in that region continued to increase.

President Pretorius, who was at the head of the Government of the Transvaal at the end of the sixties, had a better understanding of the welfare and needs of the people. He was of the opinion that instead of prohibiting gold prospecting it should be encouraged, and he accordingly caused the law prohibiting prospecting for gold to be repealed, and a reward offered for the discovery of workable gold beds.

Edward Button in 1869 found gold in the Sutherland Hills, on the Klein Letaba, and in 1870 in the double chain of hills along the Selati River, named by him the Murchison Range.

The treatise of Frederick Jeppe, "The Zoutpansberg gold fields in the South African Republic,"[1] contains Button's interesting report on these discoveries, written from Lydenburg, in 1870, to Dr. Sutherland, in Natal.

In August, 1871, the same man had the good luck to find gold on the Eersteling farm, near Marabasstad. This discovery led the Government to appoint the first gold commissioner. This commissioner represents the Government on the gold fields. The same discovery induced it to promulgate the first gold law, which reserves the right of mining gold to the Government and offers rewards for the discovery of workable gold beds.

The discovery of gold near Lydenburg is also connected with the names of Mauch and Button. The former is said to have found, in 1870, traces of gold in the Drakensberg Mountains in his trip from Delagoa Bay to Lydenburg, and Button is reported to have discovered alluvial gold in the same year in the neighborhood of Spitzkop.

While the first mining operations on what is known as the Eersteling farm, in the Marabasstad district, began in 1872, the working of the alluvial land in the Mac-Mac Valley, as well as in the valley of Pilgrims Creek (both in the Lydenburg district), was begun in 1873. In some years gold to the value of nearly $1,000,000 was found in the bed of Pilgrims Creek. Along with fine gold, smaller or larger lumps, up to the weight of 225 ounces, were found. From all directions, especially from the diamond fields near Kimberley, gold miners flocked to Pilgrims Creek to make their fortune there.

Some 500 white men, of different nationalities and of various occupations, were soon busy digging and washing in that locality. Owing, however, to the peculiar mode of occurrence of the alluvial gold, only a few were fortunate enough to find rich beds. Others spent time, strength, and money in dead ground and left the country disappointed in their hopes and poorer than when they came. In 1877 the number of miners of gold was very small.

The war against the Kaffir chief, Sekokum, in 1877, and the struggle for independence of the Boers in the years 1880 and 1881, brought mining enterprises to a standstill. Sir T. Shepstone, special commissioner during the period of English supremacy, employed the Australian mining engineer, Armfield, to explore the country and to determine whether other gold deposits existed there; but he met with no success in his exploration.

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[1] Published in the Geographical Journal for September, 1893.

Upon the reestablishment of the independence of the country, the Government in order to stimulate mining enterprise, abandoned its previous policy of reserving to itself all mining rights, and granted to the owners and lessees of land, upon payment of certain fees, the right of mining undisturbed all ores found on the land owned or leased by them. The modifications of the previous law in this respect took effect in the Origstad district, which comprises Pilgrims Rest, Mac-Mac, Waterval, and the adjoining territory, on November 11, 1881, as announced in the Staats, courant. The result was the formation of several mining companies; but only a few of them succeeded in extending their operations, and then only on the subsequent discovery of new gold beds. News came in 1882 that gold had been found on the Godwaans Plateau in a gorge near the Berlin farm. It occurred there in the native soil, in the alluvial sand and gravel, in grains and lumps, and was easily extracted. The same excitement which had previously accompanied the discovery near Lydenburg seized on the white population of South Africa. Hundreds rushed to the vicinity of the farm, but only a few were fortunate enough to derive even a slight recompense for their labor. The great majority had to leave, after having sustained heavy losses. It is stated that on an average for each ounce of gold obtained nearly $50 was expended.

In 1884 the gold miners, after prolonged efforts, finally succeeded in finding gold in workable quantities in primary gold beds. Mr. G. P. Moodie discovered that the mountains which form the so-called southern crown (kranz) of the De Kaap Valley contained auriferous quartz. He acquired a number of farms, and formed the Moodie Gold Mining and Exploration Company, Limited, which, however, did not itself conduct mining operations, but sold grants for a certain consideration to mining companies for the extraction of alluvial gold, or vein gold, or other precious metals.

Moodie's discovery naturally led to prospecting in the other mountains of the De Kaap district in which the stratification was similar to that of Moodie Mountains. Among others there was formed a company of fifteen persons, mostly storekeepers, with the object of prospecting in their joint interest. Four of them went to work, while the others defrayed the expenses. After several months of effort they succeeded in finding the Sheba beds which afterwards became so celebrated. A joint stock company with £15,000 capital was immediately organized. The first stamping experiments yielded, out of 220 English long tons of ore, 1,600 ounces, and out of 1,225 English long tons of ore 9,000 ounces, of gold. The gold deposit, which was 20 inches in thickness, lay on the surface, and could be worked like a quarry. The shares issued, with a nominal value of £1, rose in the same year to £20, and afterwards to £30 and £50. For a time they even reached £90.

With the news of this wonderful discovery, the gold fever spread again over all of South Africa. In a short time some 10,000 white men flocked into the De Kaap district. Prospecting became general, and in many places mining settlements were established. About midway between Moodie's gold field and the Sheba mine, the town of Barberton rose. Large hotels, an exchange, a clubhouse, and numerous stores were erected there. The population of the town is said to have grown to 4,000 whites.

A number of well-paying veins were found, but with them many poor ones. The latter, as well as the former, led to the formation of joint stock companies. Some mining companies (cerro del pasco) erected stamp mills and dikes for damming up streams to be used as motive power, not because they had gold deposits sufficient to justify such outlay, but merely because they hoped to find paying beds in such rich land. The original capital remained for the most part in the pockets of the first owners. The mines were, as a rule, started with insufficient capital. Wild speculation in mining shares followed. The operations, conducted in many cases by persons who, previous to their arrival in the Transvaal, had never seen a mine, were expensive and extravagant, and set at defiance every technic requirement. For this reason, and in consequence of the mines being provided with insufficient working capital, the companies met with serious difficulty as soon as such strata were reached as required larger means for their working. Thus the profit of the mining companies fell below expectations. More cautious European capitalists, therefore, in order to obtain reliable information about the actual state of things, decided to send to Barberton the American mining engineer, Gardner Williams. His opinion on almost all the enterprises was very unfavorable. Meanwhile there arose in the Witwatersrandt bright prospects of a mining industry, based on the working of a peculiar gold bed. Influenced by the loss of confidence in the De Kaap mines, everybody who was in a condition to do so withdrew, even at a heavy loss, his capital from Barberton and moved to the flourishing gold fields. A terrible decline in the value of the shares in the De Kaap district resulted. Most of the mines were abandoned. In a short time the population of Barberton was reduced to one-half. Deserted lands and ruined walls now mark the places where large houses, stores, and hotels were once located.

After much capital had been wasted, mining on the better beds improved, the old companies having been, in many cases, reorganized. Peculiar circumstances, however, still hinder a prosperous development of the De Kaap gold mines. Of the ninety-six mining companies which had been founded, with a nominal capital of over $7,000,000 and a working capital somewhat less than $4,760,000, there still exists about one-third, and of these only eighteen were carrying on operations at the time I visited the De Kaap district.

The great sensation produced by the gold discoveries in the north and east of the country did not stop the endeavors to find gold in other parts of the Transvaal. At a short distance south of the places where the Boer Marais had found gold in 1854, and of where Green, Bantjes, Sonnenberg, and others had discovered it at the end of the seventies and the beginning of the eighties, two brothers, N. W. Struben and F. P. J. Struben, found it in March, 1885, on the Wilge Spruit farm, where Arnold had also come across it the year before. The Struben brothers shortly afterwards found it at other places south of the Witwatersrandt in conglomerate strata or reefs,[1] which, contrary to all experience, contained gold in apparently paying quantities. Although the beds were pronounced by an expert unprofitable, the Struben brothers erected, in December, 1885, a five-stamp mill, to make milling experiments, and found in one sample of the ore from the Bantjes Reef Mining Company's property 1.4146 ounces to the ton. The outcrops of the conglomerate beds were further investigated and found to be rich in gold in so many places that the Government decided, on July 18, 1886,[2] to proclaim the nine farms, Roodepoort, Vogelstruisfontein, Paardekraal, Langlaagte, Turffontein, Randjeslaagte, Doornfontein, Elandsfontein, and Drietfontein, and, subsequently, other farms, public gold fields. Shortly after, auriferous conglomerates were found near Klerksdorp.

The phenomenal occurrence of gold observed on the gold fields previously mentioned was repeated in the Witwatersrandt and near Klerksdorp. Workingmen anxious to be employed in the mines, men greedy of gain, and men with a passion for speculation, who hoped to make a fortune in mining shares, traders, hotel keepers, and others flocked to the scene of the discovery. Laborers for the lower grades of work were found in the Kaffirs, who were attracted in great numbers, and Ferreiras Camp arose amid ox carts, tents, and forges built of sheet iron where the bow of the Witwatersrandt reaches the extreme southern point.

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[1] In the Witwaterstrandt the conglomerate reefs are called banket reefs, because similar in appearance to a Dutch cake called "banket."

[2] According to other statements, on September 20, 1886.

Hard and rough was the life in this new settlement at the time of its foundation, but the situation soon improved.

It became evident before long that working conditions on the new gold field were entirely different from those on others, for instance, on the Lydenburg gold field, where the metal, occurring in alluvial form, could in a simple manner be obtained from the surface by the efforts of individuals. In the new gold field the metal was so finely divided in the bed rock that even in the richest parts it could be observed only in very small particles. Although the conglomerate near the surface was much disintegrated, blasting to break up the mass, mills with many heavy stamps to crush it, and the sinking of shafts for following up beds with a heavy dip were found necessary. The typical, simple, rough gold miner found no appropriate field. Companies with larger working capital had to be formed and mining operations had to be conducted on a solid economic basis, with due regard to all technical improvements, if the ore, which was relatively poor as regards the amount of gold to the ton, was to be made to pay. At the beginning of mining activity the management of the mines in the Witwatersrandt, as was previously the case in the De Kaap district, was undertaken by people who had never before seen a mine but made a living as seamen and carpenters or by following trades not especially calculated to fit one for the occupation of a miner. Many grave mistakes were made. However, the leading capitalists soon realized that only with the aid of properly qualified, experienced, professional men could the mines be worked to advantage. Owing to the employment of such men the mining industry of the Witwatersrandt, as well as of some other districts, was gradually brought to the high degree of development possible under the conditions that prevailed there. Englishmen, Americans, and Germans contributed to this success.

With the growth of the mining industry the settlements developed in a remarkable manner. On the Randjeslaagte, Turffontein, and Doornfontein farms the city of Johannesburg rose. The Randjeslaagte farm was divided into lots 51½ by 103 feet, and these were rented for ninety years to the highest bidder for sums varying from a few dollars to nearly $1,000. The Government obtained from the sale of 1,800 lots about $240,000. At present some of these lots are sold at prices ranging from $1,900 to $3,330. The farms of the Witwatersrandt were, before the opening of the mining industry, only pasture land, and could be procured at from $1,660 to $3,570, but after their proclamation as gold fields many Boers sold their property for prices ranging from $3,320 to $33,200.

Up to October 1, 1892, when the junction of the Netherlands Railway with the railway lines of Cape Colony was effected, all the materials required for the building of the houses and shops of Johannesburg and for the erection of mining machinery, all the necessaries of life, and all working implements had to be hauled first from Kimberley, over a distance of nearly 300 miles, then from Vereenigung on the Vaal River, over a distance of 42 miles, on wagons drawn by oxen and mules over sandy, rocky, and often almost impassable roads, across defective bridges, or along river beds. The overcoming of the endless difficulties encountered bears witness to the great energy expended in opening the Witwatersrandt gold field.

The mining industry of the Witwatersrandt, as well as that of the neighborhood of Klerksdorp, was not spared a serious crisis, as will be seen further on. It is to be considered an especially favorable circumstance to the gold mining of the Witwatersrandt that immediately after the discovery of the gold-bearing conglomerate reefs, coal was found in the Witwatersrandt itself.

That coal was to be found on the surface of the valleys of the Olifant River and of the Wilje River, in the Middleburg district, was known long before the discovery of gold. Coal was also discovered on the Vaal River several years before gold was found in the Witwatersrandt. Very little use was made of this knowledge by the sparse population of the country. When the gold-mining industry of the Witwatersrandt began to develop, a want of good fuel was soon felt, there being no wood suitable for the purpose on those solitary pastoral plains. The working of the nearer coal beds on the Vaal River was therefore begun and large quantities of good coal were transported to Johannesburg. But in December, 1887, a bed 16½ feet thick was found at a depth of 52 feet in a shaft sunk to find a gold reef, on the Vogelfontein farm near Bocksburg, some 20 miles east of Johannesburg. This valuable discovery led to the opening of several coal mines, which at present largely supply the fuel for the Witwatersrandt.

Silver ores are said to have been found in 1867 on the claims of the present Transvaal Silver Mines, and lead glance containing silver about 1875 in the Marico district. In 1885 the Albert Lead and Silver Ore mine was opened. Since that time news of new mineral discoveries in the country have been frequent. The mining companies are joint-stock companies, with shares of a nominal value of £1, excepting the Robinson Company, which has issued shares of the nominal value of £5.

PROVISIONS OF THE MINING LAWS.

The growing mining industry of the Transvaal imperatively demanded further mining legislation. The Government, upon the reestablishment of the independence of the country, had granted partial mining freedom. The first law regarding the Government administration of the gold fields was promulgated in 1883, and later extended and amended by the law of July 30, 1885. Alterations of and additions to the first law were effected by the enactments of July 28, 1886, August 10, 1887, June 18, 1888, September 23, 1889, August 1, 1890, August 22, 1891, and July 27, 1892. The title of the law is, "Law regarding the mining of the precious metals and precious stones, and the traffic in the same, in the South African Republic," but as it treats mainly of gold mining, it is generally called the "gold law."

The provisions of this law are applicable, according to section 2, to mining for diamonds, rubies, and silver, as well as for gold. In 1891 "Provisional regulations regarding mining for base minerals on the proclaimed territories" were enacted. The gold law makes provisions as to acquisition and loss of the mining privilege, the nature and size of the claims, mining fees, the use of water courses, the use of and the erection of buildings upon open grounds for purposes of mining, Government mining offices, the condition of the workingmen, the traffic in precious minerals, and the theft of precious metals and precious stones. This law, by reason of the numerous changes and amendments made in it, has become so intricate and difficult to understand that the Chamber of Mines proposed to the Government at Pretoria to so word the law as to afford a clear comprehension of its scope. In fulfillment of the promise made by the secretary of mining, a bill drawn up in compliance with this request will, in the course of this year (1894), be introduced in the Voksraad. That any material right will be affected thereby is scarcely to be anticipated.

Of the provisions of the gold law, those as to the acquisition and loss of the mining privilege interest us most. The Government reserves to itself the property in the precious minerals. It does not, however, desire to conduct mining operations itself, but to turn to the best account the mineral treasures of the country, under the system of private ownership, carefully guarding at the same time the interests of the landowners and the financial interests of the State. To this end the legislature has provided as follows:

The landowner can not be compelled either to prospect on his own land or to allow others to do so. He may prospect on his own land by merely giving notice to the proper Government officials without obtaining a special license. Others may prospect on private property only with permission of the owner and after obtaining a prospecting license. On Government ground a prospecting license is sufficient. The landowner may, therefore, if unwilling to prospect himself, either demand a compensation for granting permission to prospectors to do so or agree on favorable terms in case of successful prospecting by others. As the landowner need not be content with compensation for the use of his property, but may, by means of higher demands, in a sense, sell the minerals on his land, he really owns them to a certain extent, notwithstanding article 1, which claims for the Government the right to all minerals. Prospecting licenses are granted only to persons who obey the laws of the land and have paid all personal taxes for six months, which term may be prolonged. Notice to the proper officials must be given of every discovery of the precious metals in paying quantities. If, after investigation, the fact be established that the deposit is worth the working, the finder is entitled to six prospecting claims and also to digger's claims, with the right of mining them without license and without paying any fees so long as he remains proprietor of such claims. If the discovery is made on private land, the Government decides whether such land shall be proclaimed an open gold field, and if it decides that it shall, it informs the proprietor, or proprietors when several farms are concerned, of its intention three months before the proclamation, in order to enable them to obtain a mine lease (mynpacht) and to take up owner's and digger's claims. The proprietors are entitled to one owner's claim for a tract less than 50 acres, to two such claims for a tract of from 50 to 200 acres, and to an additional claim for each 250 acres, and so on up to ten claims, which is the limit for one farm.

The mine lease is for one-tenth of the field, and is granted for not less than five and not more than twenty years; it may, however, be renewed after the expiration of this term. Such a mine lease can also be obtained by the leaseholder of a farm. The grant of a mine lease may be denied when the farm is to be proclaimed a public mining field, but can not be refused if proclamation is not made. The extent of the proclaimed territory, that is, the number of farms it includes, is determined by the Government.

Unexplored land can not become public mining land against the will of the owner.

After the prospector and the landowner have been satisfied, all other persons may acquire digger's claims by paying the fees fixed by law for a license, so that, in reality, partial, though very limited, mining freedom exists.

All men and women have the right to digger's claims, even persons under age, provided they reside within the Republic, while of nonresidents only male adults enjoy this right. As an individual is entitled to only one claim, he can only come into possession of a larger mining property by acquiring claims for each member of his family, if he is the father of one, or by obtaining by a power of attorney claims for other persons and then having them transferred at the office of the commissioner of mines to himself. Such a practice is necessary to make economic mining possible, as single claims are of very small size. The size of a claim varies with the mode of occurrence and with the nature of the minerals. A claim for alluvial land measures 150 feet square, a precious-stone claim 30 feet square, a quartz-reef claim extends 150 feet in the course of the deposit and 400 feet at right angles to the course, so that each claim forms a rectangle, which may, at the pleasure of the proprietor of the mine, be situated on both sides of the bed or on one side only.

A prospector may, by virtue of his prospecting license, lay out for himself a claim, or, by power of attorney, several claims, of the specified dimensions, and feel secure within the term for which the license is granted against the intrusion of others.

The prospector pays 5 shillings per month for each claim, while the miner pays 20 shillings per month if he operates with machinery, but only 15 shillings if he works without machinery. The owners of land where mining is carried on receive at the end of each month one-half of the prospecting and mining fees. The holder of a mine lease pays either 10 shillings per year for an acre of land or a fee amounting to 2½ per cent of the value of its product.

Mine leases may be granted to one or several gold miners when a deposit is found whose exploitation would not pay one miner, or where a mine already worked has been abandoned. The dimensions of a leased claim should not be under 450 feet square nor exceed 1,500 feet square. Such mine leases are granted provided no prior legal claim is made within a specified time. The fees in this case also are 10 shillings per year for an acre of land. On the expiration of a prospecting or mining license or of a mine lease the old holder has the privilege of renewing it within thirty days. Claims on which the licenses are not renewed in the prescribed manner, as well as claims whose owners are nine months in arrears with their fees, must be sold. In cases of sickness, military service, or in other cases deserving special consideration the payment of the fees may be postponed.

In cases where the public interest is to be advanced, for instance, for the building of roads, railways, canals, etc., the mining property may be condemned, but the owner is entitled to compensation therefor.

Prospecting and mining are prohibited on public squares or streets and roads and railways, in cemeteries, on inheritable lease land, on building grounds, in settlements, on commons, on dumping grounds (especially for tailings), on waterworks, on land which the mining commissioner may in the public interest exempt therefrom, as well as on those sections of private land proclaimed public mining ground, which are exempted from prospecting and mining by special arrangement between the Government and the owner. Exceptions to the foregoing may be allowed by the Government on conditions to be prescribed by it. Land to be used as roads, dumping grounds, and building lots must be ceded to the mining parties, the landowner receiving an indemnity therefor.

To secure mutual rights the claims are required to be surveyed, mapped, registered, set out by metes and bounds, or fenced in.

The financial interest of the State is cared for by charges for mining claims and by stamp duties and fees for official acts. Of special significance is the provision of the gold law that colored people are not entitled to mine on their own account. On the gold fields they may be employed only as servants to white people. "Colored," in the language of the law, includes the descendants of natives of Africa and Asia, all colored persons, coolies or Chinamen.

The provisional regulations regarding mining for base metals on proclaimed lands provide in substance: If coal, asbestus, aluminium, cobalt, phosphates, lead, copper, tin, sulphur, or other minerals for the extraction of which no special provision is made be found on proclaimed land, the gold commissioner may, with the consent of the owner, who is at liberty to stipulate terms with the finder, grant permission to extract these minerals at a charge of 5 shillings per month for a claim of 150 by 400 feet, one-half of the same to be delivered to the owner. The remaining provisions of the gold law will be discussed later, when we come to treat mining operations and the condition of the workingmen.

POLICE PROVISIONS RELATING TO THE MINES.

Until September 1, 1893, there were no mining police regulations, but at that date the miners' police law of 1893 came into force. This law provides for police inspection of the mines with regard to (1) the security of the surface in the interest of personal safety and public intercourse, (2) the safety of the buildings, and (3) the safety of the life and health of the workingmen.

The police inspection in this direction extends not only to mining proper, but also to stamping mills, to the plants for the chemical treatment of the ores, to smelting furnaces, and also to boiler and power houses. Steam-boiler inspection is also regulated by law No. 7 of 1893.

The miners' police law is, in general, the same as the miners' police regulations of Prussia, but it also embodies the experience of other gold-producing countries, especially of the United States, with due regard to the peculiar conditions of South Africa. The police inspection in the mines is made by mine inspectors appointed by the Government. It is to be regretted that in this young country there is still a lack of persons capable of filling the position of mine inspector, that is, persons who combine a long practical experience and business training in the service of the Government with good scientific and technical knowledge. The Government is not prepared as yet to go abroad to obtain persons with such qualifications. The police law, without the proper executive officials, is, for the present, a dead letter. The Government will not long be able to escape the conviction that it can not as yet do without the aid of properly qualified persons from abroad.

THE EXTRACTION OF GOLD.

According to the mode of the geological occurrence of gold there are to be distinguished:

(1) The extraction of gold in veins.
(2) The extraction of gold in reefs (more properly conglomerate seams).
(3) The extraction of gold in laterite.
(4) The extraction of gold in alluvium.

The modes of occurrence of gold ore in veins and reefs are very similar as to the hardness of the mineral, the dip and the thickness of the deposits, etc. They require like technic operations for the extraction of the gold. In both cases the treatment consists, first, in the mining of the ore, and then in the extraction of the gold from the materials accompanying it. In the case of laterite, as well as of alluvial gold, such a division into mining and extraction is frequently not possible. However, as the extraction of alluvial and laterite gold in the Transvaal is of secondary importance, we shall first discuss the extraction of gold in veins and reefs, using the latter term in the sense in which it is employed in South Africa.

MINING OF GOLD ORES OCCURRING IN VEINS AND REEFS.

The opening of the deposits of ore varies naturally with the surface formation of the land. In the hilly gold fields of De Kaap, Lydenburg, Hontboschberg, and Vryheid, traversed by deep valleys, the beds were mostly opened by adits. In the other gold fields, with a prevailing flat or slightly undulating surface, mining by adits, if at all possible, had soon to be given up and the mines worked by shafts.

In the Witwatersrandt the opening up by adits could hardly anywhere be carried down to a greater depth than 65½ feet. If a bed is easily reached from the slope of the hill, numerous levels are driven into it. The Sheba mine, in which the ore deposit is in some places covered with country rock only a few yards in thickness, has six levels driven above the valley level at vertical distances of 39.36, 49.2, and 69 feet from one another. The company intended to begin work on November 1, 1893, at a seventh level, 131.2 feet lower than the sixth, and starting from a point deeper down in the valley. Besides the Sheba workings the new level would open up the Oriental and the Nil Desperandum mines, belonging to the same company. The superficial reef gold ores of the Lydenburg field require, on the contrary, a larger number of adits situated at almost the same height. The adits have a double track only in the Sheba mine and everywhere else a single track. Their slope is slight. They are about 5¾ feet high, and need timbering only where the rock is decomposed, as is the case in the laterite mantles of the Lydenburg Mountains.

In the Witwatersrandt, Klerksdorp, Klein Letaba, Marabasstad, Malmani, and Selati gold fields inclined shafts, following the dip of the deposit and which are therefore frequently broken, are chiefly used. The sinking of vertical shafts is rarer.

The inclined shafts have the disadvantages of longer roads for transportation, larger expenses of maintenance, as well as that a pillar of considerable dimensions must be left in the bed for their protection. These drawbacks are considered by the mining engineers of the Transvaal of little significance compared with the advantages that crosscuts from the various levels for exploring the deposit are not necessary and that the mining of the ore can take place while the shaft is being sunk. If, however, such considerations could carry weight during the first years of mining in the Witwatersrandt and now in the gold fields where the mining industry is not yet on a firm financial basis, it is not altogether clear why at the present day in the

Witwatersrandt, where mining is in many instances remunerative, even in the larger and more successful mines, inclined shafts are constructed more frequently than ever. From a technic point of view this is, as a rule, a step backward unless taken for weighty financial reasons. The cross section of the shaft is always rectangular. The longitudinal axis of the inclined shafts lies in the directions of the strike of the deposit. The compartments of the shaft are in this case near one another. There are, as a rule, four such compartments, two for hoisting, one for pumping, and one for a ladderway. The inclined shafts are accordingly from 16½ to 19½ feet in length and from 5 to 5½ feet in width. The dimensions of the perpendicular shafts vary with the arrangement of their compartments. The work of deepening the shafts usually begins at the ladderway compartment, pillars being provisionally left under the hoisting compartments to protect the men working at the deepening of the shaft from accidents in hoisting.

Only where the rock is decomposed are the shafts secured by props between rectangular sets of timber and the walls covered with wooden planks. Where the rock is not decomposed the lining with planks frequently is dispensed with. Even securing with props is frequently omitted, and pieces of timber are fixed across the shafts for partitions between the compartments and for carrying the guides of the conveying vessels. In inclined shafts all the lining often consists of only the sole timbers to which the rails for the conveying vessels are fixed.

The separation of the ladderway compartment from the hoisting compartments is by no means general. In many shafts the ladderway lay open between the conductors of the two conveying vessels. The miners' police law, however, condemns such an arrangement, and makes a board partition between the ladderway and hoisting compartments compulsory.

In exploratory shafts of even a considerable depth there are, in most cases, neither timbering nor ladders. Even in the Zoutpansberg district I had to descend into several such shafts, standing with only one foot in the kibble or in a rope sling or seated on a rod or stick, while my free foot or hand was used to grope along the wall to prevent the hauling rope from swinging about. The descent into inclined shafts was made in the same way, with this difference only, that in order to prevent being rubbed against the walls the free foot had to be frequently placed on the floor.

The timber for securing the excavations comes from Scandinavia and California, South Africa not producing suitable wood within easy reach. In vertical shafts the hoisting is done mostly by cages on which the cars are pushed and on which wood guides, seldom rope guides, are made use of. In inclined shafts the winding takes place only by means of skips, as these allow automatic emptying. The skip is guided when the shaft is vertical by two angle bars or iron rails on each side, and when the shaft is inclined by one angle bar or iron rail.

The wheels of the conveying vessels are always placed laterally, whether the axle passes all the way under the kibble or is fixed to its side. The width of the lower pair of wheels is twice as great as that of the upper pair, in order that in the shaft tower the lower wheels may be made to slide on the guide leading upward, while the upper, narrower pair is, by means of a guide leading to one side and in consequence of overweight on one side, turned in such a manner that the box tips over and is emptied. For this purpose the car hangs in a frame which has an axle on the lower side of the box of the car.

Shaft covers, even over the mouth of the pits, were not numerous in 1893. They are, however, made compulsory by a police ordinance. Signals at an inconsiderable depth are given by pulling a wire, and in larger works by means of electricity. Safety catches are rare and defective. Contrivances for transferring the conveying vessels are also very rare. I noticed them only in the Ferreira mine.

Winding engines with two cylinders and connecting gearing are most frequently used. Some machines with 100 horsepower are met with. I saw a peculiar hoisting apparatus in the Letaba gold mine. By walking away from the mouth of the pit, an ox drew the conveying vessels up and lowered them by striding back. Mines with extensive grounds have two hoisting shafts. Smaller workings have only one shaft.

Levels are now, in most cases, driven out at intervals of about 100 feet along the dip of the bed. Crosscuts, driven from the pit eyes vertically to the strike, open the different veins or reefs, and levels lead from these through the workable deposits.

Crosscuts and levels pitch slightly, and have generally one track, but sometimes a double track. They are from 5 to 5¾ feet high and correspondingly wide. The levels are driven in the bed itself when it is poor and thick; put in the foot wall when the bed is thin and rich. Parallel head-ends, cut in the ore deposit itself, follow as closely as possible the head-end of the level, and are connected with the latter by headings driven on the rise, for the purpose of affording ventilation. A pillar between the level and the parallel head-end is left to protect the former while the work is going on, or the level is secured by props and boards. The securing of the level by timbering or masonry is necessary almost only in the laterite mantle of the Lydenburg gold field. The head-ends are, as a rule, worked by one white man and one or two colored men. The mining companies which reached in their operations the regions of the very hard, undecomposed pyritic ore, were compelled to introduce machine drills, for which the motive power is supplied by compressed air brought down in pipes from the surface. The work done by means of machine drills in a ten hours' shift amounts, in the Robinson mine, to 1.64 feet. The Witwatersrandt operated in the summer, 1893, over 200 boring machines of almost every description. Of this number 16 were worked in the Robinson mine. Each machine drill is run by one white man and one negro, who are paid by the job.

In well-conducted mines samples of ore are taken from all parts of the face of the wall while the driving of the head-ends is going on, and the average yield of gold carefully determined by a crucible assay, with the addition of litharge soda, borax, and flour. These assays seem to guide the company in its future operations. By marking the results of these analyses on a map of the mine a highly interesting picture of the distribution of gold in the bed is obtained. Unfortunately, for obvious reasons, it has not been possible to induce any of the mine owners to publish these results.

I have already mentioned that in the region of the reef mining in the Witwatersrandt scarcely more than two beds are worked in any one mine. The lower and upper levels are connected with one another by headings driven on the rise, or by winzes, and at these the actual working of the pillar of the reef begins. The number and the position of the headings depend on the faults and interstratifications of the bed, as well as on the progress of the forewinning. The work itself is carried on either by underhand or overhand stoping, which methods of working change, when the deposit is a superficial one, into the long-wall mining.

In working thin deposits the underlying rock is, as far as may be necessary, mined along with the ore, and the dead rock, if possible, separated from the ore underground and deposited in the cavities thus formed. The underlying rock is therefore, when practicable, attacked first. It is then well packed in the rubbish and, if it be rich ore, stoped away overhand and covered with sailcloth. After this the gold deposit itself is attacked.

Pillar and pannel work is carried on in the very superficial reefs of the Frankfort farm of the Transvaal Gold and Exploration Company; of the New Clewer Estate and Gold Mining Company, near Pilgrims Rest; of the Nooitgedacht Gold Mining Company, near Lydenburg, and of the Eastley Syndicate, near Klerksdorp.

While the mining of the ore is in progress frequent assays are made to determine whether it would be remunerative to work up the entire bed or whether the less valuable parts of it should be left untouched.

The concentration of the gold in gulfs of ore in the veins of the De Kaap gold field has led to a peculiar method of opening up the valuable parts. After a level has been driven through the ore worth mining of the upper part of the gulf, a shaft is sunk from the hanging wall of the gulf down to its foot wall. A level is then driven toward the hanging wall, and the part of the vein lying between the levels and the bounds of the hanging and foot walls are mined away.

The bed of the Sheba mine, which is over 131 feet in thickness, was worked like a quarry where the ore lay on the surface. In the deeper levels wide bodies of ore are worked at once, the bed being stoped away either overhand or underhand. In the former case the ore blasted down is used to stand on while further work is done. In the Black Reef, in which in consequence of its superficiality long-wall mining is done, the reef is first undercarved in the clay foot wall and then blasted. In developing mines the boring of holes is done by hand. Boring by machinery has been attempted in very few workings. It is to be expected, however, that it will soon become more general. In one working place fifteen Kaffirs are employed, with one white man as overseer. They are paid by the job.

In the mines near Pilgrims Rest, in the Eastley Syndicate workings, as well as in the Letaba mine of the Letaba gold fields, thorough filling up is usual in consequence of the bad, hanging country rock and the deposit being removed clear up to the inclined shaft without leaving a pillar. In other mines filling up is very rare. In most cases the hanging wall is secured from caving in by leaving the less valuable of the deposit part temporarily unworked, or else by props. In the Witwaterstrandt the employment of timber in the workings is avoided as far as practicable, because it has to be imported from a great distance and costs nearly 25 cents a foot. I saw some mines with very extensive empty spaces in which no measures whatever had been taken to secure the hanging wall. Only dynamite is in common use for blasting purposes. Of this explosive $1\frac{1}{10}$ pounds, costing about 48 cents per pound, are used to 1 ton of conglomerate.

The mineral is lowered down to the level by means of slides. At first the heading connecting the upper and lower levels serves as a slide, but later, when the work has advanced, slides have to be constructed. From the slides the mineral is hauled to the shafts in iron cars, generally by hand power. The cars are drawn by mules only in the mine of the City and Suburban Company. The cars are usually made of sheet steel, the system of construction varying widely. They have a fixed or a tipping box. The former is sometimes provided with a hinged door at the front or at one side. The cars are pushed on the drawing cages, or, in the shafts in which winding is done by skips, tipped on arriving at one of the plats where the kibbles are loaded.

The air in the mines is changed by natural ventilation. There is not generally much water in the Transvaal mines. The scant underground waters seldom penetrate lower than to a depth of 165 feet. They are best caught in one of the upper levels and raised to the surface by means of force pumps, so that the lower workings remain dry. The driving engines are erected on the surface and are, to economize motive power, provided with expansion and condensation appliances. The main rods are lowered through the vertical or inclined shafts, with bends conforming to the angles of the shafts, if necessary.

When electric light can not be used the plats and rolleyways of the more extensive mines are illuminated by stearin candles only.

The greatest depths have been reached in the gold mines of the Witwatersrandt. In the Village Main Reef mining is carried on at the depth of 512 feet; in the Robinson workings at the depth of about 510 feet. A greater depth has so far been reached only in the Sheba mine, near Barberton. Here a vertical depth under the outcrop of 577 feet and of 196 feet under Figtree Creek has been reached. Mining in all the other workings of the De Kaap and Lydenburg gold fields is still carried on above the level of the valley. The Letaba and Birthday gold mines, in the Klein Letaba gold field, have been opened up to a depth of about 130 and 200 feet. Almost all other mines of this and other gold fields are hardly anything more than exploratory workings, which have not yet reached any considerable depth.

The total number of mines worked in the year 1893 can not be given, as neither the official statistics nor the publications of the Chamber of Mines contain sufficient data on the subject. In the Witwatersrandt there were seventy mines in operation with a total output of 2,009,600 tons of conglomerate. Of these, four turned out over 100,000 tons, nine turned out from 50,000 to 100,000 tons, thirty-two turned out from 10,000 to 50,000 tons, and twenty-five turned out under 10,000 tons of conglomerate.

The Robinson mines turn out daily one-half ton to each man employed.

The Sheba mine alone, with a product of 38,146 tons between October 1, 1892, and September 30, 1893, turned out more than one-half of all the ore mined. In the Lydenburg district there were eight workings worthy of the name carrying on mining operations; in the Klerksdorp gold field, four; in the Letaba gold field, three; in the Marabasstad gold field, two, and in the Selati and the Houtboschberg gold fields, one each. Besides these, there are exploratory workings which produce no gold.

The amount of mining expenses depends in the Witwatersrandt on the thickness of the reefs attacked and on the location of the forewinning. It fluctuates between $1.66 and $8.33 per ton. It may therefore be of interest to compare the working expenses of two mines of different types. The clear cost of mining amounted in the last quarter of 1892,[1] in the Robinson gold mine, with a thickness of about 2 feet, to $5.30 per ton of the workable bed, and in the Langlaagte estate and gold mine, with a thickness of about 10 feet, to $2.30 per ton of the workable bed.

The net mining expenses in the Sheba mine amounted to about $2 per ton. The net expenditure of other mines working in veins is of course higher in consequence of the less thickness of the lodes.

FURTHER TREATMENT OF THE GOLD ORES IN STAMP MILLS AND IN EXTRACTION WORK.

The mineral raised from the mine comes to the stamp mill and to the adjoining extraction works. In the Witwatersrandt gold field the flat surface formation allows of the erection of the stamp mills as near the shafts as practicable, with the view of avoiding land transportation. In the other and more hilly gold fields this is impossible, the mines, especially in the De Kaap and Lydenburg gold fields, frequently being situated high up in the mountains and the stamp mills in the valley on creeks or on rivers some distance away.

ORE TRANSPORTATION.

In consequence of the occasional extraordinary steepness of the mountains and of the great depth of the valleys, aerial ropeways have come into general use. The longest of these connects the Sheba mine, near Eureka City, with the stamping mill near Avoca. In the Sheba mine the ore lowered along slides from the upper levels to the lowest adit level, as well as the ore raised from the lower levels up the inclined shaft by kibbles, is drawn by Kaffirs in iron cars from the landing places along the adit to the loading place of the ropeway at the entrance of the adit. The aerial roadway swings over several high mountains and deep valleys, and has a length of 2.573 miles. The difference between the highest and the lowest point of the ropeway amounts to 1,575 feet, the highest iron upright being 108.25 feet. The largest spans stretch over 1,479.28 and 1,486.84 feet. The steepest gradient is 1 to 1.6. With 18 horsepower 150 tons are hauled daily.

In like manner long ropeways connect the Ivy, Pioneer, Consort, Joesluck, and other mines in the De Kaap gold field with their stamp mills. The Clutha mine, in the De Kaap gold field, and the Theta mine, in the Lydenburg gold field, have their ore run down on ropeways from a high and steep mountain to the valley, whence it is hauled by oxen over a considerable distance to the stamp mills. In the Durban and in the Roodepoort, in the Witwatersrandt, a ropeway passes through the inclined shaft, and, reaching the surface, continues straight to the stamp mill. Self-acting inclines are also met with. In most cases, however, especially in the Witwatersrandt, tramways, on which the cars are drawn by horses, mules, or Kaffirs, connect the hoisting shafts with the stamp mills.

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[1] John Noble: *Official Handbook of the Cape and South Africa.*

STAMP MILLS.

The treatment in the stamp mill comprises the crushing of the ore, the amalgamation of the free gold contained in it, and the separation of the gold-bearing pyrites; sometimes also a preparatory picking by hand. The apparatus serving these purposes is so arranged that the ore moves through the mill house automatically from above downward.

In the older mills the contrivances for crushing the large lumps (the knockings) are placed on the top floor. Grizzlies (grates in pairs, inclined toward each other, with bars 1.97 to 2.364 inches apart) lead to the feeding platform of the crushing apparatus. The old Blake rock breaker, with one fixed crushing jaw and one movable jaw, vibrating upon a horizontal axle, was used until recently for the crushing of ore. During the last few years Gates's crusher has been introduced. It consists of a mortar and of a conical, vertically revolving pestle which enters into the mortar from below. Under the grizzlies and the crushing apparatus there is a large ore bin with a sloping floor.[1]

In the more recent plants, especially in those in which the ore is hoisted by means of kibbles, the companies prefer to crush the knockings in the shaft. The kibble coming up the shaft discharges its contents automatically into the grizzlies. This arrangement affords the twofold advantage of not requiring the mill house to be so high and of protecting it from the tremendous shocks, which are especially damaging to the top floor. In case of such an arrangement special tramways lead from the storage bins of the crushers to the funnel-shaped bins of the stamp mill. Chutes lead from the funnel-shaped bins to the mortars and self-feeders are attached to these, so that only a definite quantity of ore can be discharged into the mortar. The favorite feeder is the Challenge, which is provided with a rotating tray. In some few stamp mills hand feeding is still practiced. One funnel-shaped bin generally supplies four batteries consisting of one mortar and five stamps each.

Stamps weighing from 650 to 728 pounds were formerly used, but since the region of the undecomposed conglomerates has been reached the employment of heavier pounders has become necessary. In the newest mills stamps of 957 pounds weight are used. The shoes and dies are made of cast steel, and recently also of chrome steel. An effort has been made in the Selati gold mine to increase the effect of the stamps by means of air cushions placed in a special cylinder through which the stem passes, but the effort has not been successful. In the battery box, as a rule, two copper plates, coated with mercury on one side and placed under the charging door, can be so screwed in that the mercury surfaces face each other, 4 to 10 inches apart. The discharge opening is closed by a wire-gauze screen which has 400 to 1,000 meshes to the square inch. Screens with 400, 700, or 900 meshes are generally used. According to the quantity of ore turned out by the mine, the mills have from 10 to 160 stamps.

An amalgamating table of the same width as the battery and from 8$\frac{2}{10}$ to 11$\frac{1}{2}$ feet in length stands in front of each battery. It is made of wood and has side strips to prevent the slime from running off the sides. It slopes, and is so placed that the one of its narrower sides which faces the mortar and has the greatest elevation reaches from 4 to 8 inches below the lip of the mortar. The angle of the inclination of the tables can be changed. These tables are covered with several sets of amalgamated copper plates. The amalgamation tables (aprons) are succeeded by a blanket sluice, if oxidized ores are treated, and if the ores be unoxidized, by one, two, or three Frue vanners; sometimes, instead of these, by blanket sluices or a kind of American (Scoular) table.

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[1] Gates's rock breaker is fully described in Glückauf for 1894, p. 300, by Professor Schultz, of Aix la Chapelle.

The Frue vanner consists of a fixed frame provided on each of its narrower sides with a roller, and of a belt made of white rubber. The belt moves over the somewhat inclined longitudinal surface of the apparatus, rising toward the apron, descends at the end of the Frue vanner, travels through water underneath, and then passes along the lower surface of the Frue vanner to the other end, when it again begins its ascending motion. By an eccentric contrivance as many as 200 side shakes per minute are given to the Frue vanner.

Other apparatus, used only in particular places, will be described later on. Amalgamation pans, retort furnaces, and smelting furnaces also belong to the necessary requirements of the stamp mills. The mill plants are either so erected that the stamps, together with the aprons and Frue vanners, are all situated on one side or on two opposite sides of the funnel-shaped bins.

OPERATION OF THE STAMP MILLS.

The operation of the stamp mills proceeds in the following manner:

The ore arriving from the mine is dumped into the grizzlies; the smaller pieces fall through them into the funnel-shaped ore bins, while the knockings slip down to the feeding platform of the crushers, and only after passing through Blake's rock breaker or Gates's crusher do they fall into the funnel-shaped ore bin.

Those mines which work conglomerates very rich in gold, but thin, have to mine along with the ore much country rock, which can not be sufficiently separated under ground. Hence several of these workings, as, for instance, the Robinson, the Ferreira, the New Rietfontein Estate, and others, separate the knockings by hand previous to their delivery into the crushers. The knockings are liberated from the sludge by sprinkling them with water, after which the white pebbles of the conglomerates become so plainly visible that the lumps of the country rock which contain no metal can be easily picked out and thrown aside. This arrangement, which relieves the stamp mills and the MacArthur-Forest process from the necessity of treating the deads, is very essential and finds more and more application. Small quantities of ore are discharged at regular intervals from the funnel-shaped bin into the mortar by means of self-feeders.

Water being added to it in quantities exactly determined by experiment, the ore is pulverized so finely that it passes through the fine screen of the discharge. The number of drops of the stamps per minute fluctuates between 60 and 80. The work done by the stamps varies with the nature of the ore crushed. In the year 1893 1,955 stamps, on an average, employed in the Witwatersrandt crushed 2,009,379.5 tons of ore, or 1,028 tons per stamp, an average of 3 tons a day per stamp. The ore crushed by one stamp per day amounted in the Robinson mine to 4 tons, and in the New Unified mine to 4.3 tons. Very hard ore wears out the shoes and dies so rapidly that they generally last not longer than three months. In order to insure uniform wear the cams that lift the stamps catch the tappets of the latter in such a manner as to cause with each lift of the stamp a small turn. In 1892 there were in the whole country 3,441 stamps. In the Witwatersrandt there were, in 1892, 2,530 stamps, of which the average number in operation was 1,907; in 1893, 2,655 stamps, of which the average number in operation was 1,955.

With the aid of the amalgamated copper plates screwed into the mortar, and of the mercury, which is hourly poured into the battery in quantities of 363 grains, amalgamation of the free gold contained in the ore to the amount of one-half of the gold produced as amalgam takes place in the mortar. The free gold not caught in the mortar and some gold amalgam (this should be prevented by not allowing the amalgam to become too thin) flows in a broad and thin stream with the slimes, coming out through the screen over the amalgamated (sometimes silver-plated) copper plates of the aprons. The proper inclination of the aprons and the swiftness of the stream of slime are determined by experiment with great exactness. The oxidized ores require a greater inclination and swiftness than the unoxidixed, because the former are frequently accompanied by clayey ingredients, which easily settle if the inclination is too slight. A large portion of the free gold contained in the slime is now caught by the mercury of the plates.

The amalgam of the copper plates fastened in the mortar and the amalgam of the aprons is, because of its firm adherence, either scraped off with spatules or rubbed off with india rubber. In using spatules care must be taken not to scratch the copper, lest it should contaminate the gold, and that no unevenness be produced. The scraping of the plates in the mortar and the removal of the amalgam formed at the bottom of the mortar takes place every two days, and the rubbing of the plates of the apron once or twice a day. As a rule 20 per cent of the amalgam is obtained in the mortar and 80 per cent on the apron. The amalgam is, after the addition of the mercury to soften it, washed by hand or machinery, then dried, freed by means of a magnet from the iron particles arising from the wear of the stamps, and finally heated in retort furnaces. The mercury distills over and is condensed in a cooled receiver, while the gold remains in the retort. This gold, which is still contaminated with copper, iron, silver, etc., is smelted in crucibles with an addition of borax or saltpeter and soda, when the greater part of the impurities passes into the slag.

The yield of gold naturally varies in different works. A well-conducted mill produces at present by amalgamation 55 to 60 per cent of all the gold contained in the ore. This percentage will decrease somewhat in the course of time, because the workings constantly extend further into the region of the undecomposed ore, in which the pyrites, with the property of partly withholding the finely divided gold from amalgamation, increase in quantity, causing a corresponding decrease of free gold. It may be mentioned as an example that in the Robinson mine the undecomposed ore amounted to no more than 12.5 per cent in 1891, while at the end of 1893 almost only undecomposed ore was hoisted.

The gold obtained by amalgamation is about .875 fine, and therefore needs to be refined before being used for coinage or in the arts. As refining is not carried on in the Transvaal, the gold mines get for an ounce of amalgam gold from $17.61 to $18.56.

It was attempted in some places to supersede the stamp-mill process by mill amalgamation by the Crawford or Huntington mill and other apparatus, but without success, as they are not adapted to the treatment of very hard quartz and conglomerates. The Huntington mill, in the Wolverdon gold mine, was only two days in operation.

The slimes passing over the aprons flow in some works directly into settling tanks; in others, over sluices covered with coarse blankets, and in others still, upon the Frue vanners or Sconlar tables.

In the gold mills which crush only oxidized ores the blankets are used for the purpose of retaining as much free gold as practicable. The blankets are now and then liberated from the deposited heavy mineral particles by washing in tubs. The mineral particles are ground in the Meyer & Charlton and the Champ d'Or gold works in Berdan pans, after mercury has been added to produce gold amalgam.

The accumulations from the blankets are treated in the Simmer and Jack works in Wheeler pans, in the New Rietfontein Estate and gold mine in Chilean mills, after the addition of mercury for the amalgamation of the gold. The gold is then extracted by distilling off the mercury and melting with borax. In the Crown Reef mine the concentrates from the undecomposed conglomerates, which consist mostly of auriferous pyrites, are caught by blankets and washed by a strong jet of water into special tanks and then sold to chlorination works, where they are subjected to further treatment.

In most mines the concentrates are separated from the slimes by means of Frue vanners. The slimes flowing from the apron pass over a sluice upon the Frue vanner, falling down near the upper end of the belt, and are well distributed over one-fourth of its length and across its entire width. The pulp meets with a light, clear-water washing as the belt travels uphill. Owing to this washing and to the side shakes caused by the eccentrics, both being, like the motion of the belt and its inclination, carefully suited to the different kinds of ore, the lighter particles of the ore and rock flow down the inclined table in a direction opposite to that of the belt and drop over into a waste launder. On the other hand, the heavier mineral particles settle on the belt and fall down into the water tank underneath the Frue vanner. In the Pioneer gold mine, near Johannesburg, the concentrates are caught by means of Scoular tables or peculiar buddles, with lateral discharge for the concentrates. They do not, however, prove efficient, a large part of the concentrates passing into the tailings. Perhaps this drawback will be remedied by the construction of intermediate varieties of Scoular tables.

The cost of operating the stamp mills varies with the manner in which the operations are conducted and with the nature of the ore. The cost of milling in the Robinson gold mine amounted, in 1891, to $1.82 per ton of ore; in 1892, to $1.16, and in 1893, to $1.

The tailings, the light particles of the ore and rock, which in some works are treated as such as soon as they flow down the aprons, also the mineral particles which pass through the waste launders from the blanket sluices, Frue vanners, and Scoular tables, still contain considerable free gold which was not retained by the amalgamated plates, as well as large quantities of auriferous pyrites, even where good machines for dressing the ore are used. The quantity of gold contained in the tailings may be stated to be, on an average, from 123.44 to 138.87 grains to the ton. The tailings are, therefore, conducted into ponds in which the grainy and somewhat heavier parts—the sands and the more clayey or loamy, the most finely divided masses, that is, the slimes—settle after they have been again at least partially separated. The ratio between the sands and the slimes varies between 3 to 1 and 2 to 1. The sands for the most part sink immediately after entering the pond, in its upper part, while the slimes are deposited in its lower part, nearer to the dam. The separation is promoted by various devices. Thus there are in the New Rietfontein Estate works two ponds, one succeeding the other, situated at different elevations and communicating through a slit cut through the dam of the upper pond. The slit is, according to the degree of fineness of the sands, so closed by pieces of board laid horizontally as to allow the entrance of the slimes only into the lower pond. In the Randfontein and other gold mines the separation is effected by means of a spitzkasten, or pointed box, placed over the upper pond; the sands sink through the stream that flows upward through this pointed box into the pond for the sands, while the lighter slimes are carried away by the current of water and pass through a launder into the pond for slimes. Experience has shown that the slimes are in most cases richer in gold than the sands; the former are said to carry 55 to 60 per cent, the latter 40 to 45 per cent of the total gold contained in the tailings. The reason of this is, first, that as a result of its treatment in the stamp mill the very finely divided gold is frequently present in the tailings in the form of very thin scales and is therefore easily carried off by the water; and, second, that the gold-bearing pyrites undergo a more complete disintegration than the quartz.

PLATTNER'S METHOD.

Chlorination process.—When the mining works of the South African Republic reached the region of the undecomposed ore a process had to be introduced by which the gold retained by the sulphurets could be extracted. Plattner's process, which had been employed for the first time in 1848 at Reichenstein, in Silesia (Germany), appeared especially suited for this purpose. This process is based on the property of gold to form, with chlorine gas, soluble gold chloride. It requires the presence of gold in a state of the finest division, and therefore the concentrates of the Witwatersrandt are peculiarly adapted to be treated by it. It requires also the absence of sulphur, because the metallic sulphides are attacked by chlorine gas. The process, therefore, must begin with a thorough roasting. This unfortunately makes it somewhat complicated and comparatively expensive.

The Robinson Gold Mining Company introduced the chlorination process in September, 1891, by first erecting one roasting furnace, which was followed by a second one in April, 1892, and by the third at the beginning of 1893. The Rand Central Ore Reduction Company, at Johannesburg, adopted the process in 1892, and began operations with one roasting furnace. At present the plant is being enlarged by the building of another furnace. The Robinson Company does not treat the concentrates of its own stamp mill only, but buys concentrates from other works and treats them by this process. The Rand Central Ore Reduction Company does not even own a mine, but was established exclusively for treating the concentrates and tailings of the mines of others. Under the able management of the experienced metallurgist, Charles Butters, of Kennett, Cal., it has grown to be one of the most important enterprises of the Transvaal. For the present these works are able to treat all the concentrates of the Witwatersrandt.

The chlorination plant consists of a roasting house and a leaching house. Long, continuous reverberatory furnaces (fortshauflungsöfen), with step grates and working holes on both sides, are erected in the roasting house. Their dimensions are about 115 by 17 feet. Behind the furnaces, at the same height as their arched roofs, there is a drying floor under which the furnace gases pass on their way to the chimney, charging hoppers, and a storage room for the delivered concentrates, while in front of the furnaces there is a storage room for cooling the roasted material. Tramways lead from the storage room last mentioned to a row of wooden vats on the upper floor of the leaching house. The vats, which are about 20 feet in diameter and 8½ feet in depth, are so housed in the floor of the upper story that their upper brims are even with the floor. The vats are made of stout wooden staves, coated inside with lead, and held together by strong iron hoops. They have a water-tight cover to prevent the escape of gases, and at the bottom discharge openings, under which cars can be pushed. A little above the bottom of the vat there is, on a wooden grating, a coir matting, which serves as a filter. Each vat in the works of the Rand Central Ore Reduction Company holds 80 tons. In front of these vats, at a lower level, another row of vats is so placed that the upper edges of the lower are at the same height as the lower edges of the upper vats. Between or somewhat to one side of the two rows of vats, chlorine gas generators are placed. Below the second row of vats a third row is situated, of which the upper edges are even with the lower chimes of the second row. The vats are so connected with one another by conduit pipes that the solutions from the upper vats can be emptied into the next lower row.

The concentrates delivered at the storage floor of the roasting house are first run into the hoppers and spread over the drying floor. After the water has been entirely expelled, the concentrates are dumped into the hindmost space of the long, continuous reverberatory furnace, and gradually moved against the flame toward the fire bridge. In the works of the Rand Central Ore Reduction Company a horizontally circulating hearth is also built in the front part of the furnace, causing all the concentrates to come uniformly into contact with the fire, so that a perfect and uniform roasting, that is, volatilization of the sulphur in the form of sulphurous acid and the oxidation of iron into ferric oxide, is effected. When sufficiently roasted, the concentrates are discharged into iron cars and carried to the cooling floor, on which they are spread. When cooled they are carried in cars to the upper row of vats in the leaching house. After one vat is filled, it is tightly closed by means of the water-tight cover. Then chlorine gas, produced in the generators from manganese dioxide, sulphuric acid, and common salt, is conveyed into the vat at the bottom during from two to three hours at first. In passing upward through the roasted ore the chlorine gas converts the gold contained in it into a soluble chloride of gold. Twelve hours after the first passing of chlorine it is again introduced into the vats. The reaction is completed when it escapes through an opening above. The passing of the chlorine is then stopped and water allowed to flow into the vat, which dissolves the gold chloride. The gold chloride solution is dissolved and passes through the conduit pipes into the next vat of the second row. The residue is carefully washed and dumped into cars pushed under the vat. Ferrous sulphate, produced by dissolving iron in sulphuric acid, is now added to the gold chloride solution which is vigorously stirred by blowing air in. Gold is precipitated, the following reaction taking place:

$$Au_2Cl_6 + 6\ FeSo_4 = Au_2 + 2\ Fe_2\ (SO_4)_3 + Fe_2Cl_6$$

After the gold precipitate settles, the solution is emptied into the corresponding vat of the third row. Since gold is soluble in ferric salts, some gold remains in the last solution. To precipitate it the ferric salts have to be reduced in the third row of vats by the addition of metallic iron to ferrous salts.

The gold pulp is taken out of the vats once a month after it has been treated with sulphuric acid and common salt to remove the still remaining iron salts, and after it has been dried it is melted in graphite crucibles with salt, borax, and saltpeter. The gold which is still contaminated with iron is .900 to .990 fine.

The cost amounts, according to information which I have received at Johannesburg, to about $17, and according to a statement in the South African Journal to about $19 per ton of concentrates. This cost is a high one. The question arises whether it is possible to diminish the expenses by some modifications of the process. Careful experiments will have to be made to determine this. Step-grate furnaces (etagenröstöfen) would make much of the manual labor of the fortshaufelungsöfen unnecessary. The production of chlorine gas and of ferrous sulphate is very expensive because of the high price of sulphuric acid. Perhaps a cheaper precipitating agent may be used instead of ferrous sulphate, or it may be that the recently erected sulphuric acid manufactory will furnish the acid at a lower price.

It remains to be mentioned that the Sheba mine, in the De Kaap gold field, and the Nooitgedacht mine, in the Lydenburg gold field, continue to ship their concentrates to England. The directors of the Sheba mine, however, have under consideration the advisability of erecting chlorination works of their own.

THE MACARTHUR–FORREST METHOD.

The cyanide process.[1]—In the first years of gold mining in the Transvaal, especially in the Witwatersrandt, the gold remaining in the tailings was allowed to go to waste, because no method for extracting it was known. In the United States the tailings were deliberately dumped into the rivers to get rid of them, and so in the Witwatersrandt a heavy rainfall, which diminished for a short time the troublesome sand, was always very welcome. Herr Adolf Goerz said in the Berg- und Hüttenmännischen Zeitung, in 1889, that in his opinion about 50 per cent of the gold contained in the ores treated was lost. It was therefore an important event in the history of the gold industry when MacArthur and the Forrest brothers succeeded in devising a process for extracting the gold from the tailings. This process was introduced into technic industry at Ravenswood, Australia, in 1889, near Barberton, and immediately afterwards in the neighborhood of Johannesburg.

The new process was met at first with distrust, which, however, soon gave way before the convincing force of the fact that considerable quantities of gold were profitably extracted by it. The African Gold Recovery Company was formed, and obtained the patent for the Transvaal. The company bought the tailings from the mines and treated them at its works. Many mining companies, however, began to erect cyanide plants of their own, having acquired from the African Gold Recovery Company the right to employ the process on the payment of a yearly royalty amounting to from 6½ to 20 per cent of the gross proceeds. The Rand Central Ore Reduction Company built large cyanide works near Johannesburg and several plants at different mines. In the Witwatersrandt alone, at the end of 1891, 6 companies treated tailings; at the end of 1892, 22, and at the end of 1893, 32. In that district there were at the end of 1893 cyanide works in operation, in course of erection, and contemplated, as follows:

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[1] In view of the importance of the cyanide process in the treatment of tailings the Bureau has had an exhaustive paper on the subject prepared by Mr. E. A. Schneider, Ph. D. Mr. Schneider's article will be found at the end of this extract from Herr Schmeisser's work.

IN OPERATION.

Name of company.	Number of stamps.	Tailings accumulated per month.	Tailings treated per month.
		American tons.	*American tons.*
New Chimes	40	4,000	6,000 to 8,000
Knight's Tribute Syndicate	40	3,600	4,000
New Primrose	100	13,000	14,000
Stanhope	20	1,700	1,200
New Heriot	40	4,000	3,500
Henry Nourse	25	2,000	1,800
New Spes Bona	50	4,000	5,000
City and Suburban	50	4,000	4,000 to 5,000
Village Main Reef	40	3,000	2,000
Jubilee and Salisbury	55	5,800	2,500
Ferreira	40	3,500	3,000
Robinson	60	8,000	5,000
Crown Reef	90	10,000	12,000
Langlaagte Estate	160	22,000	28,000 to 30,000
Langlaagte Block B	40 [80][1]	4,000	10,000
New Aurora West	40	4,500	4,000
Durban Roodepoort	70	6,500	5,000
Roodepoort United Mine Reef	30	3,300	7,000
Champ d'Or	40	3,500	2,000
Randfontein	40	4,800	4,000 to 5,000
New Rietfontein	25 [50][1]	2,000	4,000
Orion	40	4,000	2,000
Simmer and Jack	100	8,500	10,000 to 15,000

IN COURSE OF ERECTION.

Name of company.	Number of stamps.	Tailings accumulated per month.	Tailings treated per month.
New Kleinfontein	40 [50][1]	3,000	4,000
Glencairn Main Reef	50	5,500	6,000
Geldenhuis Estate	80	9,500	10,000
George Goch	50	5,000	5,000
Worcester	20	2,000	3,000
Langlaagte Royal	40	3,500	10,000
Princess	30	3,000	3,000
Meyer & Charlton	50	3,500	....

CONTEMPLATED.

Name of company.	Number of stamps.	Tailings accumulated per month.	Tailings treated per month.
Wolhuter	30	3,000	....
City and Suburban	....	....	8,000

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[1] The number in brackets indicate the number of stamps now owned by the company.

These works can treat, in round numbers, 200,000 American tons of tailings per month. Besides, there are at work the Rand Central Ore Reduction Company, which treats 30,000 American tons of tailings per month, and the African Gold Recovery Company. The process is based on the solubility of finely divided gold in a dilute solution of potassium cyanide. The apparatus and machines used for carrying out this process are, as in the chlorination method, erected in three different stories in order to take advantage of the force of gravity to transfer the solutions from one apparatus to another.

The solution vessels are usually placed on the uppermost floor. They are in most mines large round wooden vats, about 26 feet in diameter and 10 feet high. Less frequently, as in the Easley Syndicate Works, near Klerksdorp, rectangular wooden boxes are used instead of vats. These, however, have the disadvantage as compared with the round vats of being more difficult to keep water-tight. In the Langlaagte Estate and Gold Mine round tanks made of bricks and coated with cement are used. Above the solution vessels tramways are laid. At about 8 to 10 inches above the bottom of the solution vats a grating of wooden slats, covered with a coir matting to form a filter, is placed. A layer of coarse sand and pebbles is sometimes substituted for the wooden grating. The bottom is provided with an eduction pipe and in most cases also with a discharge opening which can be tightly closed and under which cars can be pushed. The solution vats have a different capacity in different works. The United Langlaagte vats hold 55 tons, the Robinson 75 tons, the United Main Reef 135 tons, the Langlaagte Estate 400 tons, and the Simmer and Jack vats as much as 600 tons.

The precipitation boxes, which are about 20 feet in length, 2 feet in width, and 2 feet in mean depth, are placed lower than the solution vessels. The boxes have a sloping bottom, at the lower extremity of which are valves that close tightly. Partitions which alternately reach from the upper edge of the box to about 1.5 inches above the bottom and from the bottom up to about the same distance below the upper edge of the box divide it into compartments 1.64 and 0.164 feet long.

On the larger compartments, about 0.8 inch above the higher bottom joint, horizontal sieves are fixed, which have thirty to forty meshes to the square centimeter.[1] Other large vats are placed below or to one side of the precipitation boxes. A filter press, pumps, heating furnaces, and pipes connecting corresponding parts complete the plant. After the settling pond is sufficiently filled with tailings the water that still remains is let out; the sand and as far as possible the slimes also are allowed to dry in the air. They are then (it is rather strange that no aerial ropeways are used in the Witwatersrandt for this purpose) conveyed by means of tramways above the upper row of vats, into which they are dumped after samples have been taken from each of the cars to determine the percentage of gold. The cyanide process has not been applied with anything like success to slimes which form an almost clayey mass, difficultly permeable to water. Thus far only few works have attempted to treat small quantities of slimes mixed with sands or, for experimental purposes, slimes without sands. Before being placed in the vats they are severed into small pieces by a cutting apparatus in the Langlaagte Estate and Gold Mine and reduced in size by disintegrators in the works of the Central Ore Reduction Company. In the further treatment by the cyanide process there are to be distinguished:

(1) Old tailings, the accumulations of past years, the sulphurets of which have been completely decomposed, and the sulphuric acid of which, formed by the decomposition, has been completely washed away by the rains.

(2) Tailings with incomplete decomposition of the sulphurets, and which are, therefore, rich in ferrous and ferric salts and in sulphuric acid.

(3) Fresh tailings from pyritic unoxidized conglomerates.

The extraction of the gold from the first class of tailings mentioned above presents no difficulties. The difficulties become of a serious nature in the case of tailings of the second class, while the treatment of the third class is yet a problem imperfectly solved and awaits further technic improvement.

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[1] Centimeter equals 0.3937 of an inch.

The relatively strongest solution of potassium cyanide in water is at once applied to the first class of tailings. The strength of this solution varies in different works. Theoretically two parts by weight of potassium cyanide would suffice to dissolve three parts of gold.[1] In reality, however, forty parts by weight of potassium cyanide are used to one part of gold. This enormous consumption of the cyanide is caused by its ready decomposition under the influence of the oxygen of the air and of the ingredients of the ore.

Dr. Simon, of Johannesberg, has found from his experience in the cyanide works under his mangement that a 0.35 per cent solution of cyanide is sufficient. Others use stronger solutions up to 0.5 per cent.

There is formed according to the equation:

$$2\ Au + 4\ KCN + H_2\ O + O = 2\ AuK\ (CN)_2 + 2\ KHO$$

A double salt, auro-potassic cyanide. The presence of oxygen is necessary for the reaction. The oxygen is generally supplied in sufficient quantity by the tailings themselves and by the water used. After having been allowed to stand for eight to ten hours the solution is drawn off, a new strong solution added, and after the latter also has been drawn off, a weaker solution, which itself becomes, through the strong solution still retained by the tailings, a strong solution. After this from 2 to 5 tons of pure water are run through the vat to wash the charge.

Tailings which contain sulphurets imperfectly decomposed, and hence many ferrous and ferric salts as well as sulphuric acid, are, on being placed in the vats, first washed with water to remove, as far as practicable, the free sulphuric acid and the soluble iron salts. A very weak cyanide solution which had already been used for similar treatment is then added. As this solution runs off it is slightly bluish in color, owing to the iron salts that still remain. The strong solution of potassium cyanide is now added. The ferrous salts still held by the tailings take up the free oxygen of the latter as well as that of the water in their oxidation, so that there results a deficiency of oxygen for the formation of the double salt of gold and potassium. Hence an artificial supply of oxygen becomes necessary.

The fresh tailings from the unoxidized pyritic ores may be either neutral or acid. If neutral, they are treated in dissolving the gold in the same manner as the very old tailings, the sulphuric acid in which had been removed by the rains. If acid, the setting free of the gold is effected as it is in older tailings which still contain sulphuric acid. The gold solutions of the three classes of tailings above mentioned are conveyed to the precipitation boxes. The lixiviation of one vat takes about twenty-four hours. The treatment in the vats is so conducted that some are being charged while the solution is being effected in others and while the residue of the tailings from which the gold has been extracted are removed from others still. The lixiviated residues are discharged through openings at the bottom into cars pushed under the vats. In the Langlaagte Estate and Gold Mine where the brick tanks can not be provided with discharge openings at the bottom, the residues are loaded into mine-car boxes, which are lifted by a crane from the wheel frame and lowered into the tanks.

The larger compartments of the precipitation boxes are, either directly or by means of suspended zinc boxes perforated at the bottom, filled with zinc shavings prepared by turning zinc disks on a lathe, immediately before using them in order that they may have a fresh surface.

While the gold solution flows through the zinc shavings, passing downward in the large compartments and upward in the small compartments, the gold is precipitated, and falls to the bottom as fine gold slime. The opinion of metallurgists regarding the chemical reaction which results in the separation of the gold is divided. Some hold that the zinc directly replaces the gold according to the equation:

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[1] Dr. Schnabel: Handbuch der Metallhüttenkunde, 1894, p. 856.

$$2\,KAu\,(CN)\,2 + Zn = K_2Zn\,(CN)\,2 + 2\,Au$$

Others are of the opinion that the precipitation of the gold takes place according to the equations:

$$2\,Zn + 2\,H_2O = 2\,ZnO + H_2$$
$$2\,AuK(CN)\,2 + H\,2 = 2\,HCN + 2\,KCN + 2\,Au$$
$$2\,HCN + KHO = 2\,KCN + 2\,H_2O$$

According to this view the ZnO of the first equation is soluble in the excess of KHO. The reaction is promoted by the electric current arising from the contact of the zinc with the precipitated gold, which current decomposes the water. The hydrogen thus set free decomposes the auropotassic cyanide, while the liberated oxygen oxidizing the zinc causes a great loss of that metal.

From the precipitation boxes the solutions, which are now almost free from gold, flow down into the vats of the lowest story, whence they are sooner or later, according as they are strong or weak, again pumped up into the solution vats. The quantity of gold still unprecipitated is therefore not lost. If the solution has become too dilute its concentration is increased by the addition of a strong potassium-cyanide solution. Enrichment of the solution in zinc does not occur because the zinc derived from a former treatment is always precipitated in the following treatment, when treated with the tailings in the solution vats, and removed with the residue of the process.

It is best to remove once a week the gold slime which is contaminated with large quantities of zinc. It has been found that if the slime is taken out less frequently a loss of gold results, caused probably by the metal redissolving. The unconsumed zinc shavings are at first rubbed in the solution in the zinc boxes against the walls of the latter, in order that the gold slime still adhering to them may be detached and fall to the bottom. Naturally, the loosening of the slime effected in this manner is by no means complete. This is, however, not of much consequence, as the zinc shavings are used until dissolved.

The zinc-gold slime is now drawn off through the discharge openings at one side of the zinc boxes, collected on blankets, and dried and roasted to effect the oxidation of all of the base metals. The heating in roasting must be moderate, to prevent as far as possible the sublimation of the zinc, because the volatilizing zinc carries away mechanically some gold with it. The roasted mass is melted in a crucible with borax, soda, and sand. The base metals pass into the slag, while the gold and also the silver, if present, settles at the bottom or remains in the slag in the form of fine grains. The slag is therefore ground in ball mills (kugelmühlen), so that the grains of gold can be washed out. The precious metal is then fused again and cast into bars.

If the roasting has been perfect the bars, which still contain an admixture of zinc, are found to be about .860 fine. The bars are sold without refining. The yield of the cyanide process is only about 65 per cent of the amount expected from a chemical analysis of the gold slime. This loss is mainly ascribed to the unfavorable effect of the zinc sublimation. Besides, the washing out of the gold from the tailings is never entirely complete.

The total cost of the MacArthur-Forrest process amounted, at the time of its introduction, to about $3.60 per ton of tailings, but has been reduced with growing experience in the best conducted works to $1.20 to $1.30. The average expenses are $1.80 per ton of tailings.

The results from the cyanide process in the Robinson mine in 1893 were, according to the annual report, as follows:

Items.	Total expenses.			Per ton (short)	
	£	s.	d.	s.	d.
For wages for both whites and blacks, including board	3,406	11	8	1	2.81
For sundry materials	1,408	9	1	0	6 12
For fuel	1,204	19	9	0	5.24
For potassium cyanide, 64,411 pounds (1.16 pound to the ton)	5,563	0	2	2	0.19
For zinc, 12,521 pounds (0.23 pound to the ton)	260	4	3	0	1.13
To contractors for filling and emptying the vats	4,325	12	2	1	6.81
For payment of the royalty to the African Gold Reduction Co	3,768	1	1	1	4.38
Total	19,936	18	2	7	2.68

There were treated 55,200 tons (short) of tailings. In these tailings there were contained, as per assay, 20,186.06 ounces of fine gold, and there were extracted from them 17,921.20 ounces of crude gold of the value of £56,280.

This corresponds to a yield of 13,872 ounces of fine gold, or of 68.7 per cent of the gold contained in the tailings. The loss of potassium cyanide amounted in the early days of the employment of the process to from 4 to 5 pounds per ton of tailings, but this loss has been reduced in some cases to 0.75 pound, which corresponds to a fall in price of 1 pound of potassium cyanide from about $2 to 46 cents.

In the works of the Nigel, the Langlaagte Estate and Gold Mine, the New Rietfontein Estate, the Langlaagte Block B, and the Crown Reef companies not only the tailings but the concentrates also are treated by the cyanide process. To effect a complete solution of the gold the concentrates are, I was told, treated for twenty-four days with the cyanide solution. It is therefore yet an undecided question whether this application of the process is cheaper than the chlorination process.

The importance of the introduction of the cyanide process in the gold mining industry of the Witwatersrandt is shown by the fact that 13 per cent of the total gold production in 1892 and 20 per cent in 1893 were extracted from the tailings. Without the discovery of the cyanide process this proportion of gold would have been lost. Only the introduction of the cyanide process made it possible for many mines to become paying enterprises.

There was produced by the MacArthur-Forrest process, when the gold extracted from the concentrates is included, a total of, in:

Date.	Kilograms.	Per cent of total yield.
November, 1892	562	17
March, 1893	621	18
August, 1893	1,057	25
January, 1894	1,353	29
March, 1894	1,400	28

The visiting committee of the African Gold Recovery Company reported at the general meeting of shareholders in London on September 22, 1893, that the total production of the Witwatersrandt during the year from July 1 to June 30, 1893, without the yield of the MacArthur-Forrest process was 33,812 kilograms, and with the yield of the process was 40,844 kilograms. The gold product by the cyanide process therefore amounted to 7,032 kilograms, equal to 28 per cent of the total gold product. Some mines are said to have produced 35 to 50 per cent of their output by the cyanide process.

Notwithstanding the fact that potassium cyanide is very poisonous, the application of the process on a large scale does not seem to be particularly injurious to health.

While the accounts of the use of the cyanide process in other gold-producing countries, especially in the United States, are not favorable, it has undoubtedly achieved great success in South Africa, owing to the purity of the ores. Important improvements in it were made during the few years succeeding its introduction, although it can not yet be considered technically perfect. Its drawbacks consist, in the first place, in the necessity of maintaining spacious settling ponds and of conveying the tailings back from the ponds to the extraction works; in the large consumption of potassium cyanide; in the difficulty of preparing the zinc shavings and the treatment of the same; in the losses of zinc and gold; in the high royalties which the cyanide works have to pay to the African Gold Recovery Company for the privilege of using the process; and in the fact that the slimes can not as yet be successfully treated by it. Constant endeavors are being made in different directions to remove these drawbacks. In some mines, as the Salisbury, the New Heriot, the City and Suburban, and the Crown Reef, an effort was made to convey the slimes directly to the solution vats as they passed over the aprons, without treating them by concentrating apparatus and in settling ponds. After experience has shown, however, that the slimes settle under the water so densely that they can not be sufficiently impregnated with the potassium cyanide solution, an endeavor has been made to separate the loamy slimes by placing pointed boxes over the solution vats, in which the slimes are removed by a rising stream of water and in which only the concentrates and sands sink. An effort is now being made to cause a uniform deposition of the sinking mass, and the excess of water is allowed to run out through openings situated one above the other, and which are closed as the settled mass increases. This treatment, however, requires very careful supervision to prevent the deposition of conical heaps, in which a concentration of the heavier particles toward the center, and therefore a nonuniform distribution of the gold, would take place. This method has besides the drawback that the slimes must none the less be collected in settling ponds, where they are kept until further treatment.

The Salisbury Company gave up this method of treatment because the gold yield became irregular and decreased as compared with the previous output. The new Heriot Company, which is said to have been more successful, as well as the City and Suburban and the Crown Reef companies, continue to experiment in this direction. In the mines of the latter companies the solution vessels are square brick tanks provided with side openings, through which cars for the discharge of the leached masses can be pushed. While the tanks are being charged the side openings through which the excess of water is allowed to escape are closed, according as the mass of tailings rises.

In the works of the Rand Central Ore Reduction Company another process is at present being tried. The tailings are run through a distributer, which is moved about after the manner of a Segner's water wheel, by the flowing of the tailings into a tank filled with water. The sands and a part of the slimes sink to the bottom of the tank, while another part runs off with the overflowing water. After the tank is filled the tailings are drawn off at the bottom and dumped into the solution vat. It is presumed that the settling of the tailings under water and the subsequent dumping of the masses cause a more uniform distribution of the gold and allow of the working simultaneously considerable quantities of slimes in the further treatment of the tailings.

The disadvantages accompanying the precipitation of the gold by zinc have caused a less expensive precipitating agent to be sought for. To this end Molloy has recommended the precipitation of the gold by potassium or sodium, the reaction taking place according to the following equations:

$$K_2 + H_2O = 2\ KHO + \left\{ \begin{matrix} H \\ H \end{matrix} \right.$$

$$2 \left\{ \begin{matrix} AuCN \\ KCN \end{matrix} \right\} + H_2 = 2\ HCN + 2\ KCN + 2\ Au$$

$$2\ HCN + 2\ KHO = KCN + 2\ H_2O$$

Sodium may be substituted for potassium in the above formulas as well as in the statements made below.

In using potassium for this purpose it must be so finely divided as not to come in any large quantity into direct contact with water, lest potassium hydroxide be at once formed. A potassium amalgam produced in the electrolytic way, by using a lead plate as an anode and mercury as a cathode, and adding the potassium in the form of carbonate dissolved in water, is therefore employed. The potassium carbonate is decomposed by the action of the electric current, the potassium combining with the mercury to form potassium amalgam, while the oxygen passes to the lead and carbonate escapes.

When auropotassium cyanide is passed over potassium amalgam, the potassium decomposes the water and combines with a part of the hydrogen and the oxygen, forming potassium hydroxide, while the nascent hydrogen decomposes the double cyanide, resulting in the formation of hydrocyanic acid and potassium cyanide, and simultaneously setting the gold free, which combines with the mercury, producing beautiful long crystals of gold amalgam. The hydrocyanic acid is, in turn, decomposed by the potassium hydroxide, and potassium cyanide and water are formed. In order, on the one hand, constantly to have a large mercury surface, and on the other to remove from the mercury the black precipitate of iron which is formed, presumably by the decomposition of potassium ferrocyanide, the mercury must be stirred continually. Solutions rich in gold are more advantageously treated by this process than solutions poor in gold. This process, however, is still in the experimental stage; its employment is as yet too expensive. It remains to be seen whether it is susceptible of such improvements as will render it generally and profitably applicable.

The firm of Siemens & Halske of Berlin, has proposed the precipitation of gold by electricity, and, in order to test the process, erected an experimental plant at the works of the Rand Central Ore Reduction Company.

In this process the solution of auropotassium cyanide flows through a precipitating box of the same length, height, and width as the zinc boxes, divided into compartments, not, however, like the latter, of different, but of the same size. The solution is made to pass through the compartment downward and upward alternately. Iron plates and lead foil are suspended in the boxes. The former serve as an anode, the latter as a cathode. The gold precipitates in a very thin layer on the lead foil. The lead foil containing the gold is melted once a month and the lead removed. The power consumed in the production of the electric current amounts to 5 horsepower per 100 tons of tailings.

As the experimental treatment of 10 tons of tailings daily proved satisfactory, the Worcester Gold Mine erected works, which have been in operation since April, 1894, and which can treat 3,000 tons of tailings a month. It is hoped by means of this process, besides saving the zinc and removing the difficulties of zinc precipitation, to reduce the loss of gold at least to 25 per cent of the amount ascertained by an assay of the tailings.

Quite recently it has been tried to effect the precipitation of gold by aluminum. According to the equation

$$6\,(AuK(CN)\,2) + 6\,KHO + 2\,Al = 6\,Au + 12\,K(CN) + Al_2O_3 + 3H_2O$$

This process presents the advantage of the chemical regeneration of the potassium cyanide. There is a great difference of opinion as regards the value of the innovations in the cyanide process mentioned above. A satisfactory solution of the problem would undoubtedly considerably reduce the cost of production, especially by relieving the companies, by the introduction of another precipitating agent, from the payment of a tribute, in form of a royalty, to the African Gold Recovery Company. It is worth mentioning that it is claimed that the patent of the company is by no means legally unassailable, as, previous to the application of Messrs. MacArthur and Forrest Brothers for a patent, a certain Henry Forbes Julian, of the Transvaal, had extracted gold from ores by means of potassium cyanide.

Various other processes have also been tried and given up in consequence of their not producing satisfactory results.

The discussion of the question what influence the extension of the works into the region of the undecomposed ores and of the probable decline in the amount of free gold accompanying the increase of the pyrites will have on the processes now employed is of very great importance. As the Robinson Company's mine, which started from the outcrop, has now reached the greatest depth, and as, according to the annual report for 1893, the undecomposed ore mined from it in 1891 was only 12.5 per cent of the total ore treated by the company, while at the end of 1893 almost the only ore hoisted from this mine was undecomposed, it affords the best data to show in what measure the change of ore affects the ratio between the gold produced as amalgam from the tailings and the quantity produced from the concentrates.

According to its annual report, the Robinson Company extracted from 1 short ton (2,000 pounds) of ore:

Years.	In the stamp mill.				In concentrates.			In tailings.			Total.		
	Per cent.	*Oz.*	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*
1891..	12.5	1	1	21	0	1	16	0	7	6	1	10	19
1892..	(?)	0	19	13.24	0	1	15.93	0	5	10.98	1	6	16.15
1893..	85	1	1	23.48	0	2	5.95	0	3	18.70	1	8	0.13

It would have been of interest to extend the comparison of the yields to monthly returns. This, however, was impossible, as the published statistics of the Chamber of Mines are not arranged for all years in accordance with the same principles. For 1891 the monthly returns are lacking altogether, and for 1892 the product from the concentrates and the product from the tailings are not given separately. From the yearly returns it plainly appears that notwithstanding the increase in the percentage of the undecomposed ores the amount of free gold has scarcely diminished, while the gold produced from the concentrates has increased only immaterially. This, however, does not warrant the assumption that in the year 1894, in which only undecomposed ore is being treated, a change of the ratio between the free gold and that extracted from the concentrates will take place, a change which would essentially influence the employment of the present processes. The question is an open one whether the concentration of the ores could not lead to a diminution of expense.

In view of the fact that in the Witwatersrandt only 355 grains of gold are found in a ton of ore, it is difficult for a mining engineer accustomed to the careful work and to the high degree of the concentration of the products in the German ore-dressing establishments to comprehend that a decided disinclination to introduce ore dressing in the Witwatersrandt has prevailed for so long a time. This must be ascribed to the predominant influence of American mining engineers, who are unaccustomed to thorough concentration in their own country and who fear that the treatment of large masses would be rendered more difficult by the dressing of the ores. The Transvaal mining companies have not gone beyond the introduction of the Frue vanners and Scoular tables, which turn out only one product, but no intermediate products. In some works, for instance those of the Crown Reef, Salisbury, City and Suburban Companies even, dressing by Frue vanners was abandoned in 1893. It was only at the end of that year that the Chamber of Mines decided to investigate more closely the question of ore concentration and to consider the advisability of an exhibition of ore-dressing machines at Johannesburg. A commission was appointed to take this matter in hand. Owing, however, to the lack of returns from the mining companies, the commission has not yet been able to perform this task. The efforts of the ore-dressing technologists will have to be directed toward making the process of concentration so thorough that the tailings brought to the waste heap shall be almost worthless. The process will, moreover, have to be adapted to the treatment of large quantities of tailings at the least possible expense.

THE EXTRACTION OF LATERITE AND ALLUVIAL GOLD.

The extraction of laterite and alluvial gold is at present confined to a few works, while some years ago the production of alluvial gold in the Lydenburg district, as I have already stated, was not inconsiderable. The laterite deposits of Graskop, near Pilgrim's Rest, and of the outcrop of the Pioneer lode, in Moodie's gold field, are mined in the manner usual in open workings and conveyed to the stamp mill for plate amalgamation.

In the Crown Reef mine, in the Witwatersrandt, and in other places, the matrix which surrounds the outcrop of the bed, and in which, as the outcrop became disintegrated, gold accumulated, is subjected to the same treatment as the laterite deposits mentioned in the preceding paragraph. In the Spitzkop and Rosshill mines, in the Lydenburg gold field, the laterite is washed loose by a stream of water which stands under a pressure of from three to five atmospheres, and is discharged against the deposit through a nozzle 1.179 inches in diameter. The ore is then carried off in long, slightly inclined sluices, 2.12 feet wide and 1.15 feet high. These sluices have such a quartzite or sandstone pavement as to cause the water to have an undulating course. The heavier gold is deposited in the upper part of the sluice and the finer gold in the lower part.

The retention of the gold is promoted by placing mercury in the cavities of the sluices. The pulp which has run through the sluices is conducted, after the coarser parts have been carried away over a sieve, over blankets to catch more gold particles. The coarser gold is hand washed and cleaned in pans. The amalgam is first washed with pure water and then with mercury, and the gold separated from the amalgam by distilling off the mercury.

Similar hydraulic mining was carried on some years ago in the Lisbon-Berlin mines. As soon, however, as the laterite mantle was washed away and the solid undecomposed rock had been reached it became necessary to abandon this way of mining. In the Mac Mac Valley, near Graskop, and in the Vogelstruisfontein, in the Witwatersrandt, the alluvial ground is merely washed loose by water conducted in launders. The further treatment for the extraction of the gold takes place in sluices similar to those used in the Spitzkop. Other works for the extraction of alluvial gold recently opened in the Eersteling farm, in the Zoutpansberg district, and in some other places have been closed because they proved unprofitable.

PRODUCTION AND FINANCIAL RESULTS OF THE GOLD-MINING INDUSTRY.

The yield of the whole Republic in the year 1892 was 41,225.3 kilograms, or 1,325,394 ounces. The several gold fields produced in that year:

	Kilograms.		Ounces.
Witwatersrandt	37, 663. 1	=	1, 210, 869
De Kaap	1, 963. 4	=	63, 125
Lydenburg	749. 4	=	24, 092
Klein Letaba	457. 1	=	14, 694
Klerksdorp	278. 9	=	8, 968
Malmani	64. 1	=	2, 061
Marabasstead	34. 6	=	1, 113
Houtboshberg	11. 6	=	373
Vryheid	2. 5	=	81
Selati	0. 6	=	18
Total	41, 225. 3	=	1, 325, 394

The yield in 1893 was 50,088 kilograms, or 1,610,355 ounces 18 pennyweights, of gold, as follows:

	Kilograms.	Ounces.	dwts.
Witwatersrandt	45,986.84 =	1,478,477	3
De Kaap	2,099.45 =	67,497	7
Lydenburg	912.26 =	29,329	0
Klerksdorf and Potschefstroom	759.16 =	24,407	0
Klein Letaba	204.92 =	6,587	17
Selati, etc	71.43 =	2,296	13
Malmani gold field	53.47 =	1,719	8
Vryheid gold field	0.67 =	21	10
Total	50,088.20 =	1,610,335	18

The statistics of the Transvaal give only the amount of crude gold, as the refining of the gold is not done in the country. To obtain the amount of fine gold it is necessary to deduct 10 to 13 per cent from the crude gold. The predominant importance of the Witwatersrandt is very striking. Against its production of 45,986.84 kilograms of crude gold the yield of all other gold fields is only 4,101 kilograms.

The increase of the gold production in the Witwatersrandt was, in 1891, 47 per cent of the yield of 1890; in 1892, 66 per cent of the yield of 1891, and in 1893, 22 per cent of the yield of 1892. There were 1,805 stamps in 1890; 2,199 in 1891, of which on an average 1,465 were in operation; 2,530 in 1892, with an average of 1,907 in operation, 442 more than in the previous year, and 2,655 in 1893, of which 1,955 were in operation, 48 more than in the previous year.

According to the statement of Mr. Lionel Phillips at the last annual meeting of the Chamber of Mines there were treated in December, 1892, 4 tons of ore to 1 ton of tailings, and in December, 1893, 4 tons of ore to 3 tons of tailings.

As 1 ton of conglomerate leaves not much more than three-fourths of a ton of tailings, it follows from this statement that the cyanide works extended their operations sufficiently in 1893 to be able to treat all the tailings produced. As was already proved by Mr. Phillips in the preceding annual meeting, the opinion occasionally expressed that the treatment of the old tailings caused the great increase of the gold production in recent years and that the yield of gold will fall off as soon as the old tailings have been worked up, is, therefore, unfounded.

In the year 1892 there were in the Witwatersrandt fifty-eight companies producing gold against fifty-four in 1893. This decrease is due chiefly to the consolidation of smaller workings for the sake of more economical operations.

It is necessary to mention here a fact which has been wrongly interpreted. I mean the decrease of the yield of gold per ton of ore. According to Prof. E. Suess the yield of gold from 1 ton of conglomerate was:

	Grams.	Dwts.
In 1888	35.10 =	22.65
In 1889	30.38 =	19.60
In 1890	21.14 =	13.64
In 1891	17.40 =	11.23
According to my own calculation:		
In 1892	20.90 =	13.49
In 1893	22.82 =	14.72

From these data the conclusion has been repeatedly drawn that the amount of gold decreases with the depth, and that therefore the time can not be far distant when the conglomerate reefs will prove so poor as to make the mining of them unprofitable. This conclusion, however, is not at all justified. Leaving out of consideration the first two years of mining, during which, as already remarked, an exceptionally high yield was attained for purposes of speculation through reckless winning and attacking the richest parts of the reef, the decrease of the amount of gold is due to the circumstance that more economical and improved methods of mining and the reduction of the cost of production made it profitable to attack the poorer conglomerates. In the years 1892 and 1893 the amount of gold contained in a ton of ore again decreased. Owing, however, to the larger quantities of tailings worked the yield of gold rose.

Although the cost of the separate branches of the mining industry, that is, the expenses of mining proper, of milling, and of the treatment by the chlorination and cyanide processes were given in describing the various divisions of the industry, it is necessary to consider them here in their totality in order to ascertain their joint influence on the industry as a whole. I shall begin with the Witwatersrandt. The cost of production there is variable. It rises under unfavorable conditions, especially in reefs of little thickness and many faults, to $9.50 and upward per ton of conglomerate, and sinks under the most favorable conditions—that is, in thicker and richer reefs with a more horizontal disposition of the mass and few faults—to about $4.25. The average cost of production is about $6.50 per ton of conglomerate. At this cost and at the value of about $17 per ounce of gold, a ton of ore containing 7.5 pennyweights covers the expenses; 7.5 pennyweights of gold to a ton, if conglomerate ore, are, therefore, considered as the lowest limit at which it pays to carry on mining operations. Some few mines worked under unusually favorable conditions are said to derive some profit from conglomerates containing only 5 pennyweights of gold per ton. It must not be lost sight of that thus far most of the mines have turned out decomposed as well as undecomposed conglomerates. Some of them have produced as yet only decomposed ore. With the decrease of the output of decomposed conglomerate and the increase of the winning of undecomposed conglomerate the work of mining, milling, and amalgamating will become more difficult and the cost of production necessarily increase. This increase it is estimated will not exceed $1.20 per ton.

On the other hand, a reduction of the cost of production is quite possible. The efforts of the interested parties will succeed in reducing the wages of the workingmen. The processes of extraction will, by the introduction of improvements, become cheaper. The opening of the Delagoa Bay and Pretoria and the Durban and Johannesburg railways will lower freights for the transportation of the articles necessary for the industry of mining. Increased competition in the supply of machinery and materials may be expected to reduce their prices. By the consolidation of smaller works a saving in the general expenses will be made, and by careful management it will become possible to carry on the operations more in accordance with economical principles. The amount of 7.5 pennyweights of gold per ton of ore determines at present the selection of the deposits to be worked. As a rule, only reefs which contain an amount of gold exceeding this limit are chosen. This is the reason why in the mines of the northern branch of the Witwatersrandt, as a rule, only two beds are worked. The Main Reef and the North Reef have seldom been found remunerative. Recently, however, an important change has been made. Repeated assays[1] have shown that the Main Reef carries in the Robinson mine, at a depth of 374 feet, on an average 306.94 grains of gold per ton. At a depth of 550 feet the Main Reef is still richer. It has, however, been examined only in the roof, which is about 3¼ feet thick. It is said, at all events, that it has been ascertained that the Main Reef carries in its depth a paying amount of gold. It has been decided, therefore, to attack this reef also. According to the latest information, the Main Reef, in the Meyer Charlton mine, where it was formerly worked with profit in the region of the decomposed ores, promises well in the depth. Trials in the stamp mill are said to have yielded 180.5 grains of gold to the ton on the plates and 127.3 grains in the tailings. The increased exploitation of the thick Main Reef which will, upon a further reduction of the cost of production, probably be followed by the mining of other reefs, would hold out a sure prospect of a further and considerable increase of the gold yield from a source but little explored as yet. But even without the attacking of new reefs a considerable increase of the gold production in the next years is assured from the extensive forewinning in the South Reef, South Reef Leader, and the Main Reef Leader, as well as from the recently enlarged stamp mills and cyanide works, the contemplated enlargement of the existing ones and those lately erected or whose erection is contemplated. Thus the board of directors of the Rand Mines Company made, at their annual meeting at Johannesburg on February 22, 1894, the startling announcement that several deep-level mine companies (tiefbaugesellschaften), in which they have the majority of votes, have decided to erect new mining plants, which will be able in a few years to produce yearly 1,000,000 tons of ore to be treated by 600 stamps.

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[1] The South African Mining Journal, March 10, 1894.

A fundamental condition of the possibility of increasing the output from the workings is that the supply of labor be always sufficient.

The capacity of the Witwatersrandt to employ capital is not yet by any means exhausted. Money can still find a good investment there. But he who places his capital in the Witwatersrandt must act with caution.

The still great demand of the Witwatersrandt for ready money is one of the chief causes of the arrest or at least of the small development of the mining industry in the other gold districts. The mining industry of the Klerksdorp gold field still suffers from the reaction caused by the lamentable swindling practiced in the past in mining shares, although it would under good management be capable of development, even if in consequence of lesser local extension only to a moderate degree. Scarcity of capital also affects the De Kaap, Lydenburg, Selati, Klein Letaba, Houtboschberg, and the Marabasstad gold fields. There are, however, other circumstances which retard the growth of the mining industry of these districts: The lack of coal; the disadvantage of communication by bad roads and transportation over long distances, which makes it difficult and expensive to obtain machinery and materials; climatic conditions injurious to both man and beast, and also the danger from the tsetse fly, which menaces the health of the draft animals in the eastern part of the country. These disadvantages cause a high cost of production, so that at present only few mines, working under exceptionally favorable conditions, yield a profit. In the De Kaap district I was informed of the cost of production only in the Sheba mine, where the story-shaped deposit is mined with exceptionally slight expense—$2.10 per ton. But there, also, the total cost, including the ore-dressing expenses, rose in the twelve months ended September 30, 1893, in consequence of the unfavorable circumstances mentioned, to $7.85 per ton. The total cost of production in the Birthday mine, in the Lataba gold field, amounted in 1893 to $9.75 per ton. Although the opening of railway lines to Barberton and to Selati will make the De Kaap, Letaba, and Selati gold fields more accessible and lessen the cost of procuring machinery and materials, the distances to be covered by railway transportation are so great that it will be impossible to introduce the use of coal for fuel on anything like an extensive scale. Efforts will have to be made later on to utilize water power to the fullest extent with due regard to all technical progress. It is to be hoped that the improvement of the sanitary conditions expected from the clearing of the land will be realized. A new impetus will undoubtedly be given to the development of the De Kaap, Selati, and Letaba gold fields by the opening of railway lines, in conjunction with the supply of new capital for the reorganization of collapsed companies on a more solid basis, which, after acquiring mining properties for moderate sums, will be in possession of ample working capital to enable them to bridge over the periods of the mining of the poorer parts of the ore—periods more frequent in lode mining than in reef mining.

The enthusiastic descriptions of the future of mining in the De Kaap and Zoutpansberg districts persistently circulated in the last years are greatly exaggerated. The possibilities for the development of a great mining industry are to be judged not from the number of square miles of surface over which a gold field extends, as has actually been done, but from the number and the richness of the mineral deposits, especially from their gold contents in the depth, as to which, especially in the Zoutpansberg district, serious apprehensions are entertained. Only a sober consideration of the facts will guide one in these matters and save him from self-delusion and from deluding, or even injuring, others. The mining industry of the Marabasstad gold fields will have a chance of development only after a railway has been built between Pretoria and Pierterburg.

THE FUTURE OF THE MINING INDUSTRY OF THE TRANSVAAL, ESPECIALLY THE PERMANENCE OF ITS PRODUCTION OF GOLD.

A calculation of the total amount of gold at the Witwatersrandt obtainable by mining is impossible. The gold field has not been sufficiently opened up to warrant such a calculation; for example, it has not yet been determined what parts of the field outside the north wing of the Rand will prove profitable in working. We must, for the present, limit our investigation to a well-defined and adequately explored part of the Rand and try to establish the lowest figures for this section.

For this purpose the part of the gold field lying between the eastern limit of the Langlaagte B gold mine and the western limit of the Glencairn mine is best suited. Here are situated the larger mines of the Witwatersrandt. In the year 1892 there were taken from the mines in this tract alone 782,889 ounces out of a total of 1,210,574 ounces for the entire Witwatersrandt. This tract has a length of 18.5 kilometers (11.5 miles). Making allowance for barren parts of the reef, for intersecting veins of stone, and for dislocations, 2.5 kilometers must be subtracted, leaving a profitable working length of 16 kilometers (10 miles).

Now the question arises, What shall be taken as the greatest possible depth for mining operations? As favorable geological conditions exist at the Rand, no technical difficulties present themselves apart from the increasing heat of the earth at increasing depths. The question is therefore to be answered mainly in view of the growing costs of production, necessarily caused by increasing depth. Upon this point, however, no trustworthy statement can yet be ventured, since it is impossible to foresee how the conditions which determine this problem will shape themselves here in the next few decades. The results of mining at other places must therefore be brought under comparison.

In coal mining, experience has proved that work can be continued at a profit to a depth of 800 meters (2,625 feet), and that the work is not too seriously influenced by the increased heat. To exclude all uncertainty, therefore, I have made a calculation, assuming this as the greatest depth; but at the same time I thought that I should examine the results reached by continuing mining to a depth of 1,200 meters (3,937 feet), because a valuable metal, not subject to unfavorable market conditions, is here under investigation, and because the latter depth has already been actually reached (at Prizbram, in Bohemia).

From three profiles which I made through the mines Simmer and Jack, Village Main Reef, and Crown Reef the average lateral volume of the lodes was found to be 1,430 meters for a depth of 800 meters and 2,350 meters for a depth of 1,200 meters. Consequently in the above-described tract of 16 kilometers to a perpendicular depth of 800 meters there would be a reef surface of $16,000 \times 1,430 = 22,880,000$ square meters to be worked. At present the average total thickness of lodes worth mining can not be estimated at more than 1.5 meters. Thus the total mass of ore to be removed may be calculated at $22,880,000 \times 1.5 = 34,320,000$ cubic meters; or, there being 2.7 tons to the cubic meter, 92,664,000 tons of ore.

Now, the gold yield per ton of ore in 1892 was 13 pennyweights, and in 1893, 14 pennyweights. Taking the average of 13½ pennyweights, 92,664,000 tons would therefore give a yield of 1,945,944 kilograms of gold (62,548,200 ounces).

As nearly two-thirds of the total yield of the Witwatersrandt, from 1888 to January 1, 1894, came from the mines in this tract, the above figures must be reduced by 93,000 kilograms, thus leaving 1,852,944 kilograms (59,572,149.6 ounces), of a value of $1,020,828,355, still to be mined.

The average increase of the gold product for the entire Witwatersrandt from 1888 to 1893 amounted to 7,772 kilograms (249,870 ounces) per annum. Of this increase, again, we may estimate that two-thirds (5,181 kilograms) was the average increase of the portion of the Rand, here under investigation. Supposing, now, that this average increase continues for ten years, and that thereafter production will continue at the rate then attained—from year to year about the same output—then the exhaustion of the lodes would occur in about twenty-five years from the beginning of 1894.

If mining should reach a perpendicular depth of 1,200 meters (3,937 feet), the supply of gold would be 3,104,880 kilograms (99,821,892 ounces), with a value of $1,710,506,000. At the same rate of increase it would require about forty years to mine this quantity.

At the present rate of increase, assumed in my calculation to continue for the next ten years, the yearly output at that time will be more than twice as great as now. The increase will of course not be so regular as I assumed in my calculation for the sake of simplicity. Taking into consideration the numerous preparatory works undertaken in 1893 and the extensive erection of and contracting for additional crushing mills and cyanide equipments, it may be assumed that the increase in production during the next few years will be considerably accelerated as compared with the years just elapsed. As a rule, however, years of very rapid development are followed by years of slower development—years of quiet and steady work and progress. If, however, the output should already be doubled in about five or six years—which I consider altogether possible—the time required for the work will thereby be shortened by a few years. The chief result, however, remains the same, viz, that the mines alone in the tract described, working upon two lodes, will throw upon the markets of the world $1,020,828,000 worth of gold upon reaching a depth of 800 meters, and $1,710,506,000 for a depth of 1,200 meters.

It is worthy of mention that the above results agree in the main with the conclusions reached by the American mining engineer, Mr Hamilton Smith, now living in London, who was employed by the house of N. M. von Rothschild & Sons to prepare an expert report upon the subject. This report was printed in the London Times of January 17, 1893. Mr. Smith estimated the amount of gold in the above-described tract to a depth of 915 meters (3,000 feet) at £215,000,000 ($1,044,900,000), while I estimated it at £208,000,000 for a depth of 800 meters, and £349,000,000 for a depth of 1,200 meters. The larger results of my estimate are to be attributed partly to a slight difference in the length of tract investigated and partly to the fact that a deep boring made in 1893 south of Simmer and Jack gave such results as to justify me in assuming in my profiles a less rapid dip of the lodes at lower depths.

The fact that the above tract under consideration has a length of only 18.5 kilometers (11½ miles), while the Rand is about 80 kilometers (50 miles) long, warrants the conclusion that the total results of mining here must considerably exceed the figures as above worked out, even if many of the mines lying outside of this tract should prove to be less profitable than those lying near Johannesburg.

But a reduction of the cost of production will probably hereafter permit the working of even other reefs which are not now considered profitable. From this fact a further increase in production would result. Already the Robinson Gold Mining Company has decided to begin work this year upon the Main Reef, since it has been shown by the latest investigations to contain gold in paying quantities at lower depths.

The conglomerate reefs at Klerksdorp, about 125 miles southwest of Johannesburg, resemble in their character some of the members of the Witwatersrandt group, and are therefore often considered to be western spurs or offshoots of it. At this place, unfortunately, swindling schemes in mining shares began contemporaneously with the sudden development of the mining industry at the Rand, and the reaction from this speculation has not yet been overcome. In my opinion a considerable mining industry can be developed here when the confidence of the public has been regained, when capital turns in this direction, and when a sound business management has been introduced. Mining here, owing to the more limited extent of the deposits, will, of course, remain far behind that at the Rand. The measure of its development can not yet be estimated.

The gold field at Vryheid, 180 miles southeast of Johannesburg, which I did not personally investigate, is said to be similar in its geological character to that of the Witwatersrandt and Klerksdorp. Reports, however, vary greatly as to the value of this field.

It remains to be mentioned that a gold-bearing conglomerate reef was discovered at Havertsburg, in the Zoutpansberg district; also, that similar reefs exist on the Duivel's Kantoor and on the tops of the mountains which inclose the De Kaap district to the south and east. Even though these deposits do not contain more than 4½ pennyweights (about $4 worth) of gold to the ton, still they furnish proof that the appearance of gold in conglomerates in the Transvaal is of extraordinarily wide extent.

In the De Kaap, Little Letaba, Malmani, Marabastad, Houtboschberg, and Selati gold fields the metal occurs principally in quartz veins which take the direction and dip of the mountains, but sometimes running crosswise to the strata of the mountains.

Some of the deposits in the northern part of the Transvaal are to be explained either as oolitic or as lenticular veins; that is, as fissures, which diminish with the trend and dip of the strata for a considerable distance, dwindling finally to a mere fluccan and swelling later to a considerable thickness. Meanwhile the slight extent of mining here does not yet warrant a final opinion as to these deposits. The gold is found in the veins mostly in bunches; that is, there are accumulations of it here and there along the dip of the strata. The richness of the lode is accordingly considerable in places, but elsewhere it becomes quite unremunerative.

Up to the present time a considerable depth has been reached only in the Sheba mine, near Barbeton, where a perpendicular depth of 380 feet below the outcropping and 165 feet below Figtree Creek has been reached. All other mining enterprises in the De Kaap district are still at work above the level of the valley. The Letaba and the Birthday mines in the Little Letaba gold field have reached depths of 130 and 200 feet. Nearly all the other enterprises here and in the remaining gold fields are, however, scarcely more than experimental works, which have as yet reached no considerable depth.

The development of all these gold fields is hindered by the lack of capital, by the wretched means of transportation, by the lack of coal, and by climatic conditions often very unwholesome. Mining on a large scale is therefore carried on at present only in the Sheba mine, which is operated under specially favorable conditions. From October 1, 1892, to September 30, 1893, there were removed from this mine 33,261 tons of ore, producing 31,806 ounces of gold, or 18.6 pennyweights per ton, at a cost of production of $7.80 per ton.

As soon as the Witwatersrandt, with its still great demands for new capital, has been sufficiently provided for; when, further, the railroad lines from Lorenzo Marquez to Pretoria, with a branch line to Barketon, and the line from Kamati-Poort to Leysdorp have been completed; finally, as soon as the establishments already planned and in process of building for transforming the water power of several large streams into electric power, to supply the lack of coal, have gone into successful operation, then vein mining will also undoubtedly show a rapid development. This form of mining may then contribute for an indefinite period, and in no inconsiderable measure to the increase of gold production in the Transvaal. This is also true of the rather unimportant laterite and alluvial deposits.

The following paper on the cyanide process finds an appropriate place after that on South Africa, where it is so extensively employed in the treatment of tailings:

THE CYANIDE AND ALLIED PROCESSES OF GOLD EXTRACTION.

By E. A. Schneider, Ph. D.

THE CYANIDE PROCESS.

GENERAL CONDITION AND STATISTICS.

Within the last two years the cyanide process has received an increased share of attention in the gold-mining regions of this country. The best recommendation for this process has been its successful application in South Africa. It appears that this result has been brought about by an efficient business management and particularly by favorable local conditions. During the period from October, 1891, to October, 1894, 1,125,115 ounces of gold have been produced by this process in the Rand mining district of South Africa. The following table illustrates the gradual growth of the process:

Year and month.	Total Rand output.	Produced by process.
1891.	*Ounces.*	*Ounces.*
October	72, 793	3, 300
November	73, 393	5, 732
December	80, 312	8, 300
1892.		
January	84, 560	9, 700
February	86, 649	10, 366
March	93, 244	11, 500
April	95, 562	13, 500
May	99, 436	13, 500
June	103, 252	16, 045
July	101, 279	16, 451
August	102, 322	16, 648
September	107, 851	16, 986
October	112, 167	17, 171
November	106, 795	17, 695
December	117, 749	18, 000
1893.		
January	108, 374	17, 500
February	93, 252	16, 363
March	111, 474	20, 000
April	112, 053	20, 050
May	116, 911	24, 000
June	112. 907	27, 400
July	126. 169	29, 390
August	136, 069	36, 000
September	129, 585	37, 000
October	136, 682	38, 000
November	138, 640	40, 310
December	146, 357	44, 200
1894.		
January	149, 814	51, 000
February	151, 870	51, 500
March	165, 372	56, 600
April	168, 745	56, 500
May	169, 773	57, 850
June	168, 162	58, 000
July	167, 953	57, 500
August	174, 977	64, 258
September	176, 707	62, 100
October	173, 378	64, 700
Total	4, 582, 588	1, 125, 115

The process is used in about fifty plants on the Rand.

The following is a list of dividends paid during 1893 by a number of South African companies:

Name of company.	Dividends.	Amount.
	Per cent.	
City and Suburban	100	$425,000
Crown Reef	50	300,000
Durban-Roodeport	45	282,250
Ferreira	100	225,000
Langlaagte Estate	30	705,000
Meyer & Charlton	60	215,100
New Primrose	40	391,870
New Rietfontein	25	200,000
Robinson	8	1,087,500
Nigel	50	400,000

In this country the depreciation of silver and the consequent activity in gold mining which has led to the discovery of numerous deposits of low-grade, gold-bearing ores, notably in the Cripple Creek district, Colorado, had the effect to direct the attention of mine owners to the cyanide process in view of its applicability to low-grade ores.

The following data, illustrating the present condition (January, 1895) of the cyanide process in the United States, were kindly furnished by the Gold and Silver Extraction Company of America, Limited (headquarters Glasgow and Denver):

Name of works or owner.	Locality.	State or Territory.	Capacity of works per day.
			Tons.
The Metallic Extraction Co	Florence	Colorado	150
The Brodie Gold Reduction Co	Cripple Creek	do	50
The Livingstone Gold Mining Co	Boulder	do	10
Coburn Mill	Boulder Creek	do	25
Experimental plant	Leadville	do	
Congress Gold Mining Co	Prescott	Arizona	[1]10
J. D. Helm	Wickenburg, Maricopa County.	do	[1]50
H. Duncan & Co	Tombstone	do	10
Antelope Mine Co	Tucson	do	10
The Custom Mining and Milling Co	Deadwood	South Dakota	10
Black Hills Gold and Silver Extraction, Mining, and Milling Co.	do	do	50
Union Mills Co	Tuscarora	Nevada	[1]20
J. Chiatowitch	Silver Peak, Esmeralda County.	do	[1]15
Standard Mining and Milling Co	Mono County	California	[1]50
Frazier Mining Co	Ventura County	do	15
Revenue mine	Madison County	Montana	50
The Gold Mill Gold and Silver Mining Co.	Quartzburg, Boise County	Idaho	10
The Mercur mine	Fairfield	Utah	75
Marion Gold Mining Co	do	do	50
The Homestake Tailings Co	White Oaks	New Mexico	[1]10

[1] Treats tailings.

According to information received from Mr. J. J. Crawford, state mineralogist of California, there are in this State several other cyanide plants in actual operation, of much smaller dimensions, however, than those above mentioned. They are situated at the Grand Victory mine, Placerville, Eldorado County; the Utica mine, Angels Camp, Calaveras County; the Hart mine, Shasta County, and at the Iconoclast mine, Hot Springs, Kern County (silver).

The total output of gold produced by the cyanide process in the United States from November 1, 1893, to October 31, 1894, amounted to 33,000 ounces of gold, valued at $18 per ounce, with a total value of $594,000. This amount was recovered from about 62,000 tons of ore treated.

MODIFICATIONS OF THE MACARTHUR-FORREST CYANIDE PROCESS.

A large number of modifications of the MacArthur-Forrest cyanide process have been patented, but so far as known none of them has been tried on a large scale, with the exception of the Siemens-Halske process, which has proved a commercial success.

The modifications chiefly pertain to the precipitation of the bullion from the cyanide solution; some few are devoted to the dissolution of the gold from the ore. They are briefly enumerated farther below:

A.—MODIFICATIONS IN THE PRECIPITATION OF THE BULLION.

(1) *The Pelatan-Clerici process.*—The gold is precipitated on amalgamated copper plates by electricity.

(2) *The Siemens-Halske process.*—The gold is precipitated electrolytically on thin lead sheats.

(3) *The Molloy process.*—Precipitation with sodium or potassium amalgam.

(4) *The Moldenhauer process.*—Precipitation with aluminum.

(5) *The Johnston process.*—Precipitation with pulverized carbon.

B.—MODIFICATIONS IN THE DISSOLUTION OF THE GOLD.

(1) *The Kendall dioxide-cyanide process.*—Addition of sodium dioxide to the potassium-cyanide solution.

(2) *The Moldenhauer process.*—Addition of various oxidizing substances to the cyanide solution.

STATISTICS OF THE PROCESS OUTSIDE OF THE UNITED STATES AND SOUTH AFRICA.

At present the cyanide process is in actual operation in the following plants:

New Zealand.—In sixteen plants. The returns from ore treated during the twelve months ended March 31, 1894, were: Bullion obtained from ore, 14,774 ounces; from tailings, 12,478 ounces. The year 1894 promises to be even a more successful one, six new cyanide plants being in course of erection. The bullion obtained by the cyanide process during the quarter ended June 30, 1894, amounted to 13,030 ounces from ore and 7,073 ounces from tailings. Fifty-two per cent of the total bullion product in the North Island of New Zealand was produced during that period by the cyanide process.[1]

South Australia.—Virginia Gold Mining Company, 500 tons per month.

Queensland.—Charters Towers Works, 800 tons per month. Two plants at Croydon, 2,000 and 1,500 tons per month. Pioneer Gold Mining Company, 1,000 tons per month.

Straits Settlements.—A plant for the treatment of 1,000 tons per month.

India.—The Mysore Gold Mining Company, Mysore, a plant for the treatment of 2,000 tons per month.

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[1] Dr. A. Scheidel: The Cyanide Process.

CHEMISTRY OF THE PROCESS.

The cyanide process is essentially a chemical one. Unfortunately, up to date this fact has not been sufficiently appreciated. Considering the importance of the subject, very little truly scientific research has been devoted to the chemistry of the process, which is by no means so simple as many are inclined to believe.

Only recently has the fundamental principle of the solution of gold in potassium cyanide been fully established by the brilliant and accurate research of MacLaurin. This chemist proves beyond any doubt that gold is absolutely insoluble in potassium-cyanide solution unless oxygen is present. The reaction takes place according to the equation:

$$2\ Au + 4\ KCy + O + H_2O = 2\ AuCyKCy + 2\ KOH$$

The patentees of the process have viewed this reaction in an entirely different light. In a paper read before the Society of Chemical Industry, March 31, 1890, Mr. F. S. MacArthur makes the following statement:

"Elsner has stated metallic gold dissolves in cyanide of potassium only in presence of oxygen. Not having seen the original account of Elsner's researches, I am not in the position to criticise his experiments, but I never could find that the presence of oxygen was necessary either to dissolve gold by itself or from ores by cyanide. If a piece of gold be immersed in a cyanide solution so that air to act on it would have to penetrate 2 inches of the solution, the gold will dissolve in its usual slow and steady fashion. The equation shows that either oxygen must be absorbed or hydrogen evolved. I have seen no evidence of the former, and can adduce no proof of the latter; but I think the latter the more probable, because I can not conceive oxygen penetrating even a film of cyanide solution without at once oxidizing the cyanide to cyanate, whereas in the other case, as suggested to me by my friend Mr. Ellis, the nascent hydrogen may be at once seized by the excess of cyanide present and ammoniacal compounds formed. However, we do not concern ourselves much with the reaction of pure gold, but, as a matter of fact, we can not find that oxygen plays any part in the cyanide extraction of gold from ores. We have treated an ore with cyanide with free access of air, and then a parallel experiment was done with boiled water, the bottle filled to the stopper with solution and ore and the stopper sealed. The extraction was the same in both cases."

The necessity of the presence of air for the dissolution of gold in cyanide has its great drawback. Potassium-cyanide solutions are extremely unstable in the presence of air, and to this fact is undoubtedly due, among other reasons, the large excess of reagent which is consumed above the theoretically required quantity for the dissolution of gold. This opinion is sustained by the experience of practical workers in this field. Dr. A. Scheidel says: "The great loss of cyanide takes place during the extraction process, and particularly during the first part of it, as proved by the rapid diminution in the strength of the solution." (Bulletin 5, California State Mining Bureau, October, 1894.)

That, however, weak solutions are more stable than strong ones—a statement which has been recently made—is erroneous.

The important question of neutralizing acid ores in a suitable manner has been thoroughly discussed by L. Janin (Mineral Industry, 1893), and the perusal of his remarks on the subject is indispensable to anyone engaged in the practice of cyaniding.

The problem of how to utilize the double salt of zinc potassium cyanide, which is formed so abundantly in the course of the process, has, on the other hand, received very little attention. To precipitate the gold from the cyanide solution sometimes 96 times more zinc is used than required by theory. One pound of zinc should precipitate about 6 pounds of gold. The actual consumption is, however, considerably larger, and amounts to from 5 ounces to 1 pound of zinc per ounce of gold recovered. (Dr. A. Scheidel.) The utilization of the solutions thus formed therefore becomes imperative.

At present it is the custom to treat fresh quantities of ore with the zinc-potassium-cyanide solution. Mr. Feldtmann, a South African expert, states that it "appears" that by means of pure zinc potassic cyanide (without admixture of free potassic cyanide) gold is dissolved from ores. "Presumably," he adds, "the zinc cyanide in the double salt is precipitated."

From an experiment performed by Dr. Scheidel it is evident that the formation of zinc potassium cyanide is not due primarily to the action of the zinc on the excess of potassium cyanide present.

Filiform zinc, to the amount of 0.2634 grains, was submerged in 50 c.c. of cyanide solution of 0.26 per cent; after seven days of frequent agitation these were reduced to 0.2584 grains, and after fifty-six days to 0.2252 grains, which means that after seven days, 1.98 per cent, and after fifty-six days, 14.47 per cent of the zinc was dissolved.

The reason for the excessive consumption of zinc must be looked for in the presence of caustic potash.

Recently another method of gold precipitation from cyanide solution has been introduced by the firm of electricians, Siemens & Halske. More recently Mr. Eissler, who had an opportunity of examining the Siemens Works in South Africa, gives a favorable account of the method in the Mining and Scientific Press, San Francisco, December 22, 1894. The precipitation of the gold takes place in very dilute solutions. To obtain the best results the electrodes should have a very large surface. The most suitable metal for the cathode is lead, and as an anode iron is used. To make the precipitation as abundant as possible constant diffusion of the solution is necessary. In view of the importance of the method, the description of Messrs. Gernet and Eissler is quoted literally:

CONDITIONS WHICH THE METAL CATHODE MUST FULFILL.

(1) The precipitated gold must adhere to it.

(2) It must be capable of being rolled out into very thin sheets, to avoid unnecessary expense.

(3) It must be easy to recover the gold from it.

(4) It must not be more electropositive than the anode in order to prevent return currents being generated when the depositing current is stopped. The most suitable metal for the purpose is lead rolled out in very thin sheets, which is therefore used in the Siemens-Halske process, and which meets all the requirements of the case.

The anode consists of iron.

ELECTRIC CURRENT REQUIRED FOR PRECIPITATION.

In order to precipitate the gold from cyanide solutions only a very weak current is required—that is to say, a density of about 0.6 ampere per square foot. With cathodes about 1½ inches apart, 7 volts is sufficient.

The advantages gained by using such a weak current are:

(1) The gold is deposited hard on the plate.

(2) The iron anodes are preserved for a long time, as their waste is in proportion to the current strength. In a plant treating 3,000 tons per month 1,080 pounds of iron are destroyed in that period.

(3) Little power is required. A 3,000-ton plant requires 2,400 watts, equal theoretically to 3½ horsepower, and actually requiring 5 indicated horsepower.

The precipitation boxes are kept locked, being opened once a month for the purpose of a clean up. The lead, which contains from 2 to 12 per cent of gold, is removed, replaced by new sheets, melted into bars, and cupelled. The consumption of lead is 750 pounds per month, equal to 1½ pence per ton of tailings.

According to some experts in cyaniding, one of the chief advantages which is claimed for the Siemens-Halske process, the possibility of using very dilute solutions for the initial treatment of the ore, is somewhat overestimated. The solvent action of very weak cyanide solutions is too slow for practical purposes.

A question of far-reaching importance, as far as the application of the cyanide process is concerned, is the association of gold with tellurium. We find this condition almost universal in the Colorado gold occurrences. Tellurium is to be found here invariably associated with gold, varying in quantity from a trace to abundance. In the surface ores the tellurium exists mostly as tellurous acid, but it is reasonable to expect that at a greater depth the tellurium will be found in intimate association with gold as telluride of gold. Dr. Richard Pearce, a well-known authority on metallurgical subjects, expressed himself thus on the hydrometallurgical treatment of Cripple Creek ores:

"As the Cripple Creek mines are explored to greater depths, remote from the zone of oxidation, it is not unreasonable to expect that the economic treatment of the ores by methods other than smelting will offer greater difficulties than at present exist on account of the association of the gold with tellurium as telluride." (Proceedings Colorado Scientific Society, January 8, 1894.)

It is a well-known fact that telluride of gold is insoluble in potassium cyanide. Ores containing this combination need to be roasted in order to become amenable to the cyanide treatment. But here again a difficulty presents itself which is generally much underrated—the volatility of gold in presence of tellurium. According to Kustel (Roasting of Gold and Silver Ores, 1880, p. 17) as much as 20 per cent of the gold contents may be lost in this way. It is probable, however, that by careful work the loss can be kept within reasonable limits, particularly as for the purposes of cyaniding a dead roast is not required.

Recent experiences in the South African gold mines have further shown that pyritical concentrates are occasionally liable to show a refractory behavior toward cyanide solutions. To obtain good results a contact with the liquid lasting two to three weeks is needed. The refractory behavior of such concentrates may possibly be due to the fact that the gold is present as a sulphide.[1]

IMPROVEMENTS IN THE MECHANICAL DETAILS OF THE PROCESS.

Owing to the present high development of mining and milling machinery the mechanical features of the process can be considered as very perfect. Recently great strides have been made in overcoming one of the chief obstacles to a general application of the process, the leaching of such ores as are clayey and very friable, or which yield on crushing a large amount of slime. The importance of improvements in this direction becomes evident if one takes into account the existing conditions in the South African gold fields. In a paper read before the Institute of Mining and Metallurgy in London, November 24, 1894, Mr. M. Eissler made the following statement:

"The elimination of the slimes has an economic bearing on the gold-mining industry of these fields (the Witwatersrandt) when it is considered that at least 30 per cent of the Witwatersrandt ores after crushing pass away into slime pits. Therefore, at the present production of over 250,000 tons of ore per month, 75,000 tons go into the slime pits."

Recently Mr. P. Argall, of Denver, Colo., has devoted his special attention to the subject. His ideas on the mechanical treatment of ore pulps are embodied in an article on "The cyanide process of gold and silver extraction" (Engineering Magazine, September, 1894) and in United States patent No. 527473. In his process the slime or dust (according to the system of crushing used, wet or dry) is separated from the ore particles, which possess the desired size, by a current of water or air in a specially designed apparatus. The dust or slime is intimately mixed with lime to neutralize the sulphates of iron which are present; the resulting mass is formed into bricks, which are dried and calcined. The material obtained in this way is extremely porous, and after being coarsely crushed yields excellent results on leaching.

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[1] NOTE.—It is a fact well known to chemists and mineralogists that the naturally occurring sulphides behave differently from those prepared in the wet way toward various solvents, such as acids, alkalis, and potassium cyanide. Gold sulphide prepared in the wet way is soluble in potassium cyanide. The natural surmise is that native gold sulphide, if such one exists, is insoluble in the latter solvent.

Next in importance to the proper treatment of the slimes comes the question of barrel agitation. There is no doubt that the dissolution of gold is more rapidly effected by means of barrel agitation than by simple tank leaching. The objection has been made that this advantage is counterbalanced by the greater outlay for plant and motive power, but the most recent American practice has proved it to be erroneous. (Compare with statements in chapter on "Agitation process" in Dr. A. Scheidel's essay on the "Cyanide process.")

COST OF TREATMENT.

The cost of treatment is liable to vary owing to reasons which exercise an influence in other manufacturing industries, such as cost of labor, condition of roads, distance from railroad, etc. These conditions have therefore to be taken duly into account whenever it is desired to estimate the profits of a cyaniding enterprise; but their importance dwindles into insignificance when compared with the influence which the character of the ore is liable to exercise on the consumption of potassium cyanide, which at present is sold at 50 cents per pound.

Owing to the great variety of ores which have been treated by the process it is impossible to give figures which represent a general standard. The comparison, however, of reliable data from various sources is instructive.

The management of the Gold and Silver Extraction Company of America furnished the following data, illustrating three typical cases:

(1) *Character of ore and amount of potassium cyanide used.*

1. Suitable crude silicious ore, containing iron oxides and iron pyrites, having a value of $19 in gold, one month's run, 450 tons treated; cyanide consumed, 794 pounds, at 50 cents per pound, equals 1.7 pounds per ton.
2. Concentrates of iron pyrites, average value, $6.50 in gold; cyanide consumed, 2.9 pounds per ton; one month's run, 500 tons; cost of cyanide, $725.
3. Tailings, containing $5.20 in gold per ton; cyanide consumed, 1.27 pounds per ton.

(2) *Amount of zinc used.*

1. 0.403 pound per ton prepared, at 9 cents per pound.
2. 0.65 pound per ton prepared, at 9 cents per pound.
3. 0.42 pound per ton prepared, at 9 cents per pound.

(3) *Amount of alkali solution.*

Average, where used, about 0.66 pound per ton.

(4) *Gold and silver bullion produced.*

1. Crude ore, about $8,100.
2. Concentrates, average extraction, 85 per cent.
3. Tailings, average extraction, 80 per cent.

(5) *Wages, including superintendence, for a 25-ton mill.*

	Per day.
Three men in mill, at $3	$9.00
One chemist, at $150 per month	5.00
Fuel	4.00
Oil, etc	1.00
Depreciation	1.00
Total	20.00

In an article on the cyanide process (Engineering and Mining Journal, June 9, 1894), Mr. Walter H. Virgoe gives the following facts and figures for the cost of treatment at the Mercur gold mine, Fairfield, Utah:

"The ore is a silicious limestone, carrying magnetic oxide of iron with traces of cinnabar and gold. The latter occurs in a very fine state of division, coating the particles of magnetic oxide and giving the ore a value of about $15.25 per ton. The cost of treatment, extracting 73 per cent by bullion returns from the refinery works, is about $2.40 per ton, exclusive of royalty, superintendence, and office expenses, thus itemized:

Potassium cyanide, 1.27 pounds per ton	$0.66
Zinc, 0.55 pound per ton	.05
Labor (seven shifts per twenty-four hours, six days, one night)	1.12
Supplies, repairs, fuel, and freight	.57
Total	2.40

"Lately the expenses have been still further reduced, as the amount of cyanide lost per ton of ore has been diminished and a larger quantity of ore is reduced with the same amount of labor."

The total cost of treatment at the Revenue mine, Madison County, Mont., amounts to $5 per ton, including $1 patent royalty, and consists of the following items: Crushing and labor, $2; chemicals, $2; patent royalty, $1. The actual consumption of cyanide is from 2½ to 3 pounds per ton. (Dr. A. Scheidel: The Cyanide Process.)

According to information which was furnished by Mr. T. S. Childs to Dr. A. Scheidel, at the works of the Black Hills Gold and Silver Extraction Mining and Milling Company of Deadwood, South Dakota, the total expenses for treatment, including $1 patent royalty, are $3.50 per ton.

In the South African gold fields the cyanide treatment is applied mostly to tailings. Recently Mr. Feldtmann has published some figures which show that the cost of cyanide treatment in the Witwatersrandt district is very low.

Mr. Feldtmann writes (Engineering and Mining Journal, August 11, 1894):

"The biggest item of cost is generally for the cyanide of potassium, which probably averages on the Witwatersrandt about 48 cents per ton of ore treated. A good deal of economy can be effected by a careful chemist in charge of plant. Handling of the ore may vary from 18 cents to 24 cents. The average total cost of treatment on the Rand is about $1 to $1.12 per ton in large works, whereas in small plants it may be put down at an average of $1.50 per ton."

According to Mr. M. Eissler, the working expenses at the Worcester Works (Witwatersrandt), treating 3,000 tons per month by the Siemens-Halske method, are as follows:

Items.	Monthly.	Per ton.
	£	s. d.
Filling and discharging leaching vats	125	0 10.0
Cyanide	75	0 6.0
Lime	15	0 1.2
Caustic soda	6	0 0.5
Lead	14	0 1.1
Iron	28	0 2.2
White labor	65	0 5.2
Native wages and food	20	0 1.9
Coal	57	0 4.6
Stores and general charges	41	0 3.2
Total	450	2 9.29

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[1] The total cost per ton is 3 shillings, equal to 73 cents.

Mr. Eissler adds: "This process was in practical operation at the Worcester mine for several months, where I had the opportunity of examining it. At the Meyer & Charlton mine and at the Metropolitan this process will supersede the zinc precipitation method very shortly."

No itemized data relating to cost of larger plants are yet to be found in current literature on the subject. A rough statement has been made by Mr. P. Argall (Engineering Magazine, September, 1894):

"A first-class cyanide plant, complete in all its details, costs, for a capacity of 50 tons per day, about $25,000; for 100 tons daily capacity, $40,000."

According to the statement of the builders, the total cost of the cyanide plant at the Revenue mine, Montana, including engines, boilers, stamps, and vats, all placed in position, amounted to about $20,000. The daily capacity is 20 tons.

In a communication from General Manager T. S. Childs to Dr. A. Scheidel, he states that the 40-ton plant of the Black Hills Gold and Silver Extraction Mining and Milling Company, of Deadwood, cost $25,000.

THE CHLORINATION PROCESSES.

In recent literature fewer data are to be found on these processes than on cyaniding, evidently for the reason that the chemistry of chlorination and bromination is perfectly established.

Chlorination has been practiced for many years on a small scale, notably in California, but only recently have enormous works been built. Great strides in this direction have been made by Mr. John E. Rothwell, to whom we owe the interesting description of the Golden Reward Works, in Deadwood, S. Dak., designed and constructed by himself (Mineral Industry, 1892). Particular attention has been devoted by Mr. Rothwell to the most economical handling, crushing, and roasting of the ore. These problems, as well as that of separating the gold solutions from the ore pulps, have been very successfully solved.

Chlorination in barrels, and subsequent precipitation of the gold from the solution by means of sulphurous acid and sulphuretted hydrogen, is the system which is almost exclusively used in works of recent origin.

A great deal of thought has been bestowed on the roasting of the ore at the least expense in fuel. Among recent inventions in this field Pearce's turret furnace answers admirably this purpose; it is reasonable to expect that further improvements in this direction will follow.

STATISTICS OF THE CHLORINATION PROCESS IN CALIFORNIA.

California.—Of the hydrometallurgical processes chlorination has been for a long time in favor in California. It is used at present by the following concerns:

Name of concern or owner.	Location.	County.
The Selby Lead Co	416 Montgomery street, San Francisco.	San Francisco.
E. C. Voohrhies	Sutter Creek	Amador.
Kennedy mine	Jackson	Do.
Sierra Butte Mining Co	Sierra City	Sierra.
Plumas Eureka mine	Johnsville	Plumas.
Maltman	Grass Valley	Nevada.
Champion mine	do	Do.
Providence mine	do	Do.
Standard Consolidated mine	Bodie	Mono.
Rawhide mine	Sonora	Tuolumne.
Gold Bank mine	Forbestown	Butte.
G. F. Deetken	Auburn	Placer.

None of these works has a capacity exceeding 20 tons a day.

Nevada.—A large chlorination plant is in course of construction for the gold mines of J. R. de Lamar, at Delamar.

South Dakota.—A 110-ton plant, the Golden Reward, is successfully operated in Deadwood.

Colorado.—Chlorination has gained a strong foothold, as may be seen from the size of the works which have been erected within the last few years:

(1) The Lawrence Gold Extraction Company, Cripple Creek, has a capacity of 70 tons a day (1894, 25 tons a day). A Pearce turret furnace is used for the roasting of the ore. The character of the ore under treatment is siliceous, carrying 16.4 per cent sulphur, with 0.5 to 5 ounces of gold per ton. The average extraction of the gold value is 92.6 per cent. During the last four months of 1894 the output amounted to $40,000 gold bullion. (Data furnished by courtesy of owners of the works.)

(2) The El Paso Reduction Company, Gillett, has a capacity of 80 tons per day (twenty-four hours), which will be increased as the output of the camp warrants. For roasting, a reverberatory furnace is used. Chlorination is carried out in rotating barrels. These works treat ore of any kind of character or assay value, provided the latter is high enough to pay treatment. (Data obtained from management of the works.)

(3) The United States Economic Reduction Works, Florence, Fremont County, has a capacity of 150 tons. A great many novel features have been introduced in these works, which, however, need not be described, as they have not yet undergone a practical trial. It is intended to perform the chlorination in a single barrel, which is 66 feet long and 6 feet 8 inches in diameter.

COST OF TREATMENT.

Owing to the rivalry which exists at present between the various wet processes it is difficult to obtain reliable figures concerning the cost of the chlorination process. From the fact, however, that a large amount of capital has been invested in chlorination works, and that such works are constantly being enlarged, it is evident that these ventures are profitable.

Mr. E. R. Holden, a Colorado chlorination expert, makes the following statement concerning the cost of chlorination:

"The cost of chlorination at Cripple Creek in a plant treating 100 tons per diem will amount to $4.50 per ton, always provided that the mill is built so as to take advantage of the economical handling of the ores. The mechanical features in the operation of a chlorination process are as yet somewhat crude, but when these defects are altered, as they certainly will be, from the experience which will be gained from this time on, the cost will be something less than $4.50, possibly $4. This cost of $4 can again be reduced in Colorado. We have plenty of salt at Salt Lake, Utah, which can be laid down at Cripple Creek, or any of the various gold districts in Colorado, for approximately one-half cent per pound. The cost for operating an electric plant to decompose the sodium chloride will be merely nominal, particularly if water power is used. In a careful calculation I am of the opinion that liquid chlorine can be produced in Colorado for 9 cents per pound as against a cost at the present time of about 70 cents per pound. The chlorine, which is produced by the action of sulphuric acid on bleaching powder, at the present time costs per ton of ore $1.30; this $1.30 is represented by 1½ pounds of chlorine obtained, which, if produced electrolytically, will be approximately 12 to 15 cents, thereby saving over $1 per ton in the treatment of each ton of ore. The cost of constructing a 100-ton mill on the line of any railroad in Colorado would figure between $75,000 and $85,000; this will mean a very well-equipped plant, with plenty of machinery, and all the latest improvements known in the science of chlorination."

THE BROMINATION PROCESS.

The bromination process has not been yet introduced on a large scale in the United States. There is no reason, however, why it should not become in time a commercial success. The experiments of Dr. L. D. Godshall, of Rapid City, S. Dak., gave very good results, which even point to the superiority of bromine over chlorine as an agent for the dissolution of gold.

The price of bromine—25 cents to 30 cents per pound—does not seem to be too high in order to preclude a commercial success, particularly as the amount of bromine which is required, according to the experiments of Dr. Godshall, to effect complete bromination is not large, 1½ pounds per ton.

Recently an experimental plant has been erected in Denver, which uses the process of Mr. E. C. Englehardt (United States patent No. 509368). The bromine is applied in hydrochloric acid solution, and consequently acts very energetically, a fact well known to those familiar with the methods of analytical chemistry. To neutralize the undesirable solvent action of the hydrochloric acid on the basic constituents of the ore a quantity of sodium carbonate is added to the ore before applying the bromine solution. The treatment is carried out in a rotating barrel. The patentee claims among other advantages for his process:

(1) A higher extraction of gold than by chlorination.

(2) Chemicals may be charged with more ease in handling and less danger of injury to the workmen.

(3) The action of bromine in hydrochloric-acid solution is more rapid than that of chlorine or bromine alone, so that the gold is dissolved in one or two hours instead of four. This makes it possible to double the number of charges which may be treated in each barrel.

THE LOSSEN PROCESS.

This interesting process has been recently described in a German journal of high scientific standing. (*Berichte der deutschen chemischen Gesellschaft,* Berlin, 1894, p. 2726.) In view of this an outline of the process is given here.

The crude or roasted ore is treated in a revolving barrel with an alkaline solution of bromine until all the gold is dissolved. Before filtering, a new quantity of solution is added so as to insure alkaline reaction. The gold remains in solution as an aureate, while the salts of iron and of other heavy metals are precipitated as hydroxides. Simultaneously bromide of the alkali is formed. The filtered solution is allowed to run through boxes, which are filled with scrap iron or charcoal. A complete precipitation of the gold is effected in this way. At this stage of the process the solution contains chiefly potassium bromide. By electrolizing the latter without interposition of a diaphragm an alkaline liquid is obtained, which, though not containing any free bromine, possesses the property of dissolving leaf gold. It is used to dissolve new quantities of gold from fresh portions of ore.

SUMMARY.

The wet processes of gold extraction are as yet in their infancy. A good deal remains to be done before the business is established as firmly as the older processes of smelting and amalgamation. Still their vigorous growth within the last few years points to a splendid future. It is reasonable to expect that improvements will be made whereby we shall be enabled to treat ores of the lowest grade at a profit, and that, consequently, the output of the world in gold bullion will increase steadily without necessitating the discovery of new gold fields.

Herr Schmeisser's views of the prospective gold product of South Africa may be very properly supplemented by the following paper by

Mr. Hamilton Smith, addressed to the London Times early in 1895, after he had visited the gold fields of the Transvaal a second time:

GOLD FIELDS OF AFRICA.

[Mr. Hamilton Smith, in the London Times.]

A report by me upon these gold fields was published in the Times of January 17, 1893, based upon an examination of the Rand in 1892. I have lately revisited the Transvaal, remaining there from August to December, 1894, and in this communication I propose to state in what degree my original conjectures have been verified by the actual work of mining and development during the past two years, concluding with some general observations and a review of the financial results obtained in operating the mines of the Rand district up to the end of 1894.

In the former report my belief was stated that in a few years the gold product from the Rand would increase to a value of over £10,000,000 per annum, and that a total yield of £325,000,000 in gold could be reasonably expected from this one district, this future product being chiefly dependent upon four things, viz:

(1) Will the Main Reef series continue to great depths?

(2) If they do, what will be their general inclination or dip, and to what vertical depth will it be practicable to work them?

(3) What amount of gold will be found with increased depths?

(4) On how large a scale can mining operations be conducted?

Since 1892 work has been carried on more vigorously than ever before in about sixty mines owning claims at and near the surface outcrop of the Main Reef series. From them 5,000,000 tons of ore have been extracted in the years 1893 and 1894, and, as a matter of course, the ore produced comes from deeper workings month by month; also in a number of these mines developing shafts and drifts have been sunk and driven on the reefs at considerable distances below the working stopes.

During the same period many vertical bore holes have been put down by diamond drills to the dip of the series, one of them having reached the great depth of nearly 2,500 feet; several working shafts have been sunk upon "deep-level" properties, finding the reefs of the series at vertical depths of from 600 feet to 1,000 feet, and from these shafts a considerable amount of drifting has been done. The data at hand for determining probably correct answers to the first two of the above queries are therefore now much fuller than they were in 1892.

As stated in my former report, there were three theories generally held in regard to the dip of these reefs. Some experts believed that the Rand quartzites and their inclosed beds of "banket" (conglomerates)—these beds being now universally called "reefs"—were truly conformable, but that great "step" faults would occur, abruptly lifting up the reefs and perhaps bringing fresh outcrops of them to the surface. The most general opinion, however, was that, regardless of the dips shown by the upper rocks at the surface, the inclination of the reefs would steadily flatten with increasing depths, so that in a not very great distance from their outcrop they would become nearly horizontal. The third theory was that the beds were conformable, that no large uplifting faults were probable for a distance of 3 or 4 miles from the outcrop of the series, and hence that the depth of the reefs below the surface at any particular point could be pretty closely determined by knowing the dip of the strata on the surface. Assuming either of the first two suppositions to be true, the depth at which the reefs would be found by vertical bore holes or shafts a mile or two from the outcrop would be much less than would be the case were the third supposition the correct one. In my judgment, from all the indications afforded by mining and development work up to date, the third theory appears to be much the most probable, and several of the leading experts of the district now agree with me in this opinion. The surface dip of the strata varies at different sections, generally being quite steep at the outcrop of the series, and then flattening to inclinations of from 20° to 40° for a distance of a couple of miles; in other sections the dip is as gradual as 23° at the outcrop, becoming as steep as 45° at a distance of a mile. My general conclusion is that at a horizontal distance of 3 miles from their outcrop the reefs of the main series are probably 10,000 feet, or about 2 miles, beneath the surface, and at a distance of 2 miles their depth, as a rule, will not be quite 1½ miles.

The vertical depth to which these mines can be worked with profit will chiefly depend upon the value of the ore, the amount of capital required for plant and development, the quantity of water to be pumped, and the temperature of the ground. With the abundant supply of coal in the Rand the cost of hoisting the ore from great depths will not be a very important item.

Roughly speaking, to equip the mine for working on a large scale at a depth of 3,000 feet, the first cost for plant and development, before any returns can be expected, will be £600,000. This is a large sum, and before such an expenditure is determined upon the investor ought to be well assured as to the probable value of the ore and the costs of working. None of the mines on the Rand have thus far encountered large inflows of water. Most of the water comes from springs near the surface, so that during the dry season the cost of pumping is but slight. No one can speak with certainty as to the amount of water which will be found at serious depths, like 3,000 feet, but from present indications the chances are that the inflow will not be so large, even at that depth, as to add very considerably to the cost of mining.

In regard to increase in the heat of the rocks with increased depth, I was able during my visit to make some careful determinations of the temperature of the water in the deep bore hole before spoken of. This bore hole is in comparatively dry ground, so that only a trifle of water flows from it. The water in it, therefore, is practically quiescent, and represents accurately the temperature of the surrounding walls of rock. Their determinations show a temperature of 67.2° F. at a depth of 200 feet, increasing in a regular manner to 95.3° F. at a depth of 2,494 feet; this indicates a temperature of about 100° F. at a depth of 3,000 feet. Supposing the rocks to have this degree of heat, when a mine is opened up the current of cooler air from the surface passing through the workings will reduce their temperature from 5 to 10 degrees; such a heat will add somewhat to the mining costs, but not very greatly. At the depth of 3,500 feet the high temperature will probably cause a serious addition to the mining costs. I must, however, state that the above determinations are not final, as the thermometers used must be tested again at the Kew Observatory; should it be necessary to apply a notable correction, its amount will be given hereafter.

Summing up all these facts, I think with present conditions the conclusion is warranted that with most of the mines a vertical working depth of but little over 3,000 feet can be assumed as the limit with which they can be operated at a profit, while with richer or thicker ore, such as is now found in a few of the outcrop mines, a limit of something over 3,500 feet in depth seems reasonable. Should, however, the price of skilled labor and the cost of supplies decline in time to a European level, still deeper limits would be possible.

The third and most important query is as to the continuance of the gold with increased depths. The results of boring and the developments shown by the shafts and drifts on several deep-level properties indicate that the gold content of the ore is about the same as in the outcrop mines above; but as these explorations thus far only cover a comparatively limited extent of area, I think a much safer test is to compare the yield obtained in the last year (1894) from the producing mines with their yield up to the middle of 1892. For the purpose of comparison, I will take the mines extending from the United Langlaagte to the May Consolidated, inclusive, embracing a length of about 11 miles along the outcrop, and which have furnished to date 71 per cent of the total output of the Rand. These mines are now extracting ore from an average depth of about 400 feet on the dip of the reefs, while in 1892, as stated in the former report, their average depth on the dip was about 160 feet. Taking the average returns from such a long extent of mining ground as 11 miles, with a depth increased more than twice, should afford one fairly safe data to determine whether or not future changes are probable. Up to August 1, 1892, there had been taken from these particular mines about 3,000,000 tons of ore, which had yielded 12½ pennyweights of gold bullion per ton, after making some allowance for gold remaining in tailings unworked. Since then these mines have produced about 4,000,000 tons of ore, of which a little less than 2,000,000 tons were taken out in 1894. The yield per ton in 1894 was $13\frac{2}{15}$ pennyweights of gold bullion per ton, thus apparently showing a slight increase in yield; but in the estimate of 1892 I now see that I somewhat underestimated the yield from the tailings, and my present estimate is that these mines for the 7,000,000 tons of ore mined from 1887 to the end of 1894 have yielded (including tailings, but not including slimes, which have not yet been treated on a commercial scale) at the rate of $13\frac{3}{10}$ pennyweights per ton. I therefore conclude that there is no sign whatever up to the present time of any change in the grade of the ore I may mention that in this comparison I have taken into account the sorting (throwing out the poorer pieces of rock before milling), which has lately been practiced in several mines, and, on the other hand, the greater thickness of reef matter extracted from a few of the mines.

As all present indications show that the average values of the reefs remain unchanged to a vertical depth of 1,000—say 1,750 feet upon their dip—it is not a very daring expectation to count upon ore of about the same grade to a limit of 3,000 feet vertical. It is of interest to note that up to the present time, with hardly a notable exception, the value of the ore remains nearly constant in each of the several mines; that is to say, the lowest situated ore in the best mines continues rich, while with the poorer mines the ore still continues low grade. The yield of the ore in these mines along this stretch of 11 miles varies from 8 to 27 pennyweights per ton, and I was greatly surprised during my late visit to find that this variation remains so nearly constant with increased depths. I can not but think that this will alter when much greater depths are attained, so that in years to come better ore will be found under mines which are now poor and poorer ore under mines which are now high grade.

The fourth and last query has been solved by the formation of a number of deep-level mining companies, each one owning from 130 to several hundred mining claims (a mining claim is a little less than 1½ English acres). Properties of so large an area warrant the sinking of deep shafts, and the consequent heavy expenditure of first capital cost.

In the report of 1892 I estimated for the length of 11 miles the average thickness of the ore to be worked was 5 feet; I should now estimate it to be 6 feet, but I find in many mines that a good deal of poorer ore has been left standing, so that the average yield from this thickness of 6 feet, when it is all mined, will be less than the 13 pennyweights before given; my opinion, though, as given in 1892, of the quantity of gold to be extracted remains unchanged, the greater thickness compensating for the smaller yield per ton. In 1894 the value of the Rand gold bullion was £7,000,000, and this without any increase from the new deep-level mines; these latter will become fairly productive in 1897, so for that year a product of fully £10,000,000 can be fairly expected. Judging from present appearances, a maximum product of the Rand will be reached about the end of this century, when it will probably exceed £12,500,000 per annum. In addition to the yield which may be expected from the Main Reef series, I think in a few years a considerable quantity of gold will be produced from other reefs, especially from what is called the Black Reef. This reef, with perhaps one exception, thus far appears to be what in mining parlance is called "spotted," the ore varying greatly in value in the distance of a few feet. Very likely more money will be lost than made in working this deposit, but the gold from it may in time add appreciably to the bullion output of the district.

From the foregoing statement it is evident that the chances are far greater now than they were in 1892 of my conjectures of that date being realized, and to-day nearly every one conversant with the Rand considers them as being considerably under the mark. The Rand for 1894, with its product of £7,000,000, stands third in the world, the United States still remaining first, with its greatly increased output of over £9,000,000, and Australasia (Australia, New Zealand, and Tasmania) being probably second, with a product of about £8,000,000. In 1849 the world's product of gold was about £6,000,000, which increased to something over £30,000,000 in 1853, owing to the discovery and working of the rich placers of California and Australia. From 1853 the yield steadily declined, until in 1883 it had fallen to less than £20,000,000. Since 1887 the yield has advanced by leaps and bounds, the increase being chiefly due to the new discoveries in South Africa, until for 1894 the product has most probably amounted to fully 8,600,000 ounces of fine gold, worth over £36,500,000, an output certainly much greater than that for any previous year in the history of the world. In 1853 it was evident that the great yield from both California and Australia would be short lived, whereas the probabilities now are that this great product of £36,500,000 will be fully maintained for quite a number of years to come; and yet, in spite of this fact, and this belief, the prices of commodities generally in use, such as wheat, cotton, wool, sugar, iron, copper, etc., are now lower than they have been for the past one hundred years. It has been generally accepted that one of the principal causes of the rise in the price of standard articles from 1849 to 1860 was due to the influx of gold from California and Australia. Will the same rise in values, measured by the ounce of gold, take place in the coming five years? This is a question of vast importance to all of us, from the richest capitalist to the poorest laborer. I see that at least one authority of position seems to be of the opinion that the probable rise in prices due to this great flood of gold will have the effect of so increasing the cost of mining and reduction that many mines in the Rand will be compelled to suspend work. This, I think, is an altogether erroneous view, for should general prices recover to their level of ten or fifteen years ago, this additional cost would be fully compensated for by the increased economies which year by year will be carried into effect in operating the Rand mines; so, unless a mountain of gold should be discovered somewhere or other, the Rand will in every probability continue to increase its yield for at least five or six years to come.

Admitting that the foregoing anticipations of such a large gold product from the Rand will be realized, it does not necessarily follow that the profits to mine owners as a class will be correspondingly great. In most mining districts the brilliant success of a few rich mines has had the effect of inducing men to expend large sums in exploiting neighboring mines, with disastrous financial results, so that in the long run the aggregate losses have often been greater than the aggregate profits. The Rand deposits are, however, so much more regular than has been the case with previous gold deposits or lodes that it is almost certain that in the next twenty years or more the profits from working them will much exceed the losses. Still the investor should remember that even on the Rand there are mines and mines, some good and some poor, and that in order to avoid losses careful discrimination in his ventures will be necessary. The excellence of these mines is not due to their exceeding richness, but to large continuous bodies of ore of moderate grade. In order to work them profitably first-rate mechanical plants are necessary, and they must be skillfully and economically managed. I think it is safe to say that there are now on the Rand not more than three or four mines which would yield any considerable profit were their management radically bad; hence the investor should in advance inform himself as to this important point.

From the regularity which has thus far characterized the reefs, it is now not very difficult to make a pretty fair guess as to the length of life which each mine will have; hence one is willing to risk his money and then calculate what the rate of amortization will be to protect his capital. As to expected profits, past results now afford a pretty fair guide, but the prudent investor should not forget that nearly every mining man—I do not claim to be an exception—is oversanguine when counting upon future mining profits.

From the Rand mines, since their commencement, in 1887, up to December 31, 1894, I estimate that 10,110,000 tons of ore (2,000 pounds each) have been extracted, yielding 6,544,584 ounces of gold bullion, worth about 69 shillings per ounce, and thus having a gross value of about £22,600,000. The dividends paid by the producing mines during the same period amount to £4,484,541, but of this sum I consider nearly £200,000 was unquestionably not fair mining profit, so that £4,300,000 can be assumed as having been the net returns, or 19 per cent of the output. For the year 1894 there was milled 2,827,365 tons, coming from fifty producing mines, yielding 2,024,162 ounces of bullion, worth about £6,980,000, and the dividends declared by them for the year amount to £1,406,266, being 20 per cent of the output. The market value of these fifty mines on January 19, 1895, taking middle quotations, was £33,000,000.

During 1894 several of the leading mines expended a considerable portion of their earnings in paying for property and in the construction of new works, and quite a number of the fifty mines referred to will in 1895 be able to increase their output, and in all probability their dividends also. On the other hand, several of these mines were operated at an actual loss in 1894. From 1887 to 1894, inclusive, the profits made in actually working the mines of the district have, I think, been much more than the losses, although in the years 1887 to 1890 large sums were expended in developing mines, many of which thus far appear to be worthless. As a rough guess I should say the losses from 1887 to the present time amount to £2,000,000, while the dividends distributed have been twice that sum. Since 1892 the proportion of losses to profits has been much smaller.

In quite a number of deep-level properties the work of development is now being vigorously pushed forward by means of vertical shafts and drifts from them. These new workings will be so extensive that they will before long add very greatly to our present knowledge of the Rand deposits, so that, both from an economical and technical point of view, the years 1895 and 1896 promise to be the most interesting in the history of the district. I hope, with your permission, at some future date to trace these new developments and to point out the final conclusions which can be drawn from them.

Criticising such estimates as those of Herr Schmeisser and others, the London Economist of January 29, 1895, has the following to say:

SOUTH AFRICA.

THE WITWATERSRANDT INDUSTRY.

* * * * * * *

We never sought to dispute the statements made by experts that the Rand formation is practically unique, and that the general lie of the reefs has been more or less fully proved, at all events to a depth of 300 feet, while in some of the deep-level properties the reefs have been tested at greater depths, though, as we have pointed out more than once, it has yet to be ascertained whether and to what extent the deep-level properties will be susceptible of profitable working. On the other hand, we have seen nothing to convince us that it is possible to form any reliable estimate of the amount of gold which will be produced in a given area from surface to a depth of 3,000 feet even in the Rand District. So far the great bulk of the gold obtained has come from the South Reef, which ranges from 6 inches to about 3 feet in thickness, and the Main Reef leaders, varying from a few inches to a couple of feet in thickness, for, though the Main Reef itself may in the future be worked at a profit with the improved and more economical methods of treatment now in use, in the past it has been dealt with to only a very limited extent, and has been generally unremunerative.

Seeing that the whole series of reefs varies in thickness from 10 to 200 feet, and that at various points along the district difficulties are being experienced from the excessive quantities of "slimes" and from the intrusion of pyritic rock, it is difficult to believe that anything more than a very rough estimate can be formed of the cubic contents of any given property, especially if the deep-level continuations form part of the valuation. The point we raised as to the gradual lessening of the yield of gold in depth, so far from being contested by the Mining Journal, is accepted and hailed as a favorable feature, as "an increase in the tonnage milled is always followed by a lower average yield."

This brings us to a point which is too frequently ignored, namely, the ultimate exhaustion of the properties. In some instances, as we have pointed out upon previous occasions, the "life" of the mine is estimated at only four or five years, and though the deep levels worked by the outcrop companies will, of course, lengthen their lives, still, sooner or later, even the deep levels will be exhausted.

The Mining Journal points out that as between last year and this the following increases in stamping power will take place:

Mines.	Stamps.	
	1894.	1895.
City and Suburban	50	130
Crown Reef	120	180
Ferreira	40	80
Geldenhuis Estate	80	120
Glencairn	50	70
Jubilee	35	40
New Heriot	40	60
New Primrose	100	160
Nigel	25	30
Orion	40	80
Robinson	70	120
United Main Reef	30	50
Wolhuter	40	90
Worcester	20	40
Total	740	1,250

And it is added that "this shows that fourteen companies in the twenty-one mentioned are adding 510 stamps, which will be at work during 1895. The crushing capacity of these companies will be nearly doubled (the new stamps are all heavy ones) next year, and the circumstance is not even mentioned by a responsible writer whose object is to advise the investor regarding the future prospects of the Rand industry."

Assuming that the increase in the stamping power is accurately stated, what then? Simply this, that the auriferous deposits will be exhausted so much the more rapidly or, in other words, that the life of the mines will be shorter. We can not but think that the attention given to estimates such as those of Professor Schmeisser is calculated to leave the true issue out of sight. It is assumed by unthinking people that the German professor's guess at £352,000,000 as the probable output of the central section of the Rand refers to net profits, instead of to gross output. Admitting for the sake of argument that the estimate may be fulfilled, as working expenses average quite 50 per cent, that would represent a net result on the present basis of working expenses of, say, £176,000,000, spread over some forty years. As the present outcrop companies and a few deep-level ventures are capitalized at between £50,000,000 and £60,000,000, and as these represent only a comparatively small portion of the depth from which the £352,000,000 is to be obtained, it follows that the prospect of getting adequate dividends and sinking-fund contributions is not by any means assured.

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GOLD FIELDS OF MATABELELAND.

[From the Cape Times, March 8, 1894.]

Several prospectors and miners have passed through here on their way to the Gwailo River and to the reported alluvial gold field at the head waters of the Lunde. All the experts here declare that in no country they know of is there so much visible gold as in the surface quartz of Matabeleland. The prospectors are bringing in specimens from all parts, which not only betray their glittering wealth to the eye, but also pan out well. Surface indications are very promising, but we do not know yet what lies hidden below. None of the ancient workings here are deep, as in Mashonland, but merely superficial, while there are so few mining tools at present in the country that sinking has only commenced at five shafts. The bonus mining rights, of twenty claims each, granted to all men who served in the expedition are being readily bought by outsiders at £8 each, while some have brought £15 or more. There are not wanting signs to show that there will be a considerable rush of gold seekers into Matabeleland when the country is open to the world, toward the end of April. Members of the expedition are selling their bonus farm rights (3,000 morgen) at an average price of £70, which appears far below their value, so syndicates are availing themselves of the opportunity. But, though land is cheap, everything else is extravagantly dear up here. Almost famine prices are still charged at Buluwayo for all necessaries, and these prices are likely to be maintained so long as the rain continues. For two summers past the rainfall has been very insufficient here. Had the rain failed again this summer there would probably have been a famine in the land. But now there is small fear of that calamity, for more rain has already fallen than is required to fill all the fountains of the rivers, and there is no prospect yet of an improvement in the weather.

THE WEST COAST OF AFRICA.

[From the Annual Report on the Gold Coast, London, 1892.]

MINES OF THE GOLD COAST.

There are no manufactures of trade value, and mining is confined to gold mining. The country is rich in gold; it is to be found everywhere in large or small quantities, and there is no native family in the country without its ornaments of the purest gold and often of artistic workmanship. The insignia of the court officials of a native king are almost invariably covered with beaten gold, and gold dust among the natives is a common means of exchange.

The natives mine for gold in a very primitive manner; they do not use mercury, and their returns must be small compared to what they might be. I am indebted to Mr. G. E. Ferguson, a native Government officer, for the following description of native mining, which is taken from his report upon a Government mission which at the end of 1890 led him through the country of Akim, which abounds in gold:

"A native miner has but few implements—a long-bladed spud or digger, a wooden bucket for bailing out the water or hoisting up the stuff, and a bowl for washing or 'vanning' make up the list. He rarely makes his shaft more than 3 feet in diameter. Planting one end of his digger in a recess in the shaft, he places the other end diagonally against the opposite side of the shaft, and, supporting himself by it, his foot is placed in another of the recesses. He then lengthens out his body and fixes his back firmly against the side of the shaft. Thus supported, he removes the digger, plants it in another recess below the first, and, by repeating the operation, gets to the bottom of the shaft. A tunnel, which can not be long (for his neighbor's shaft is only 15 to 20 feet from him) is next driven.

"In some cases there is a quick return, nuggets worth £100 not being rare, as I was informed by the chief of Asiakwa. From all I can learn the yield is about £2 10s. per ton.

"Whatever the yield may be, the numerous shafts serve as catch pits for surface water, and as the rainy season sets in all the workings are suspended; a few are renewed during the dry season, while most of them are permanently deserted and new shafts sunk. In this way the Akim miner honeycombs the ground, and by interfering with the natural distribution of the water wastes the mineral resources of his country."

For many years past gold mining on an extensive scale has been carried on by several English mining companies in Wassaw. These mines were visited early in 1889 by Governor Sir Brandford Griffith, and his excellency's report[1] has been printed and presented to Parliament. Large sums of money have been spent on machinery, but the difficulty of landing machinery and the further difficulty of transporting it to the mines have been great hindrances in the development of what ought to be a prosperous and handsomely paying industry. Mismanagement has not been absent, and no doubt other causes have been at work to prevent success, but Sir Brandford Griffith in his report says that his visit impressed him with the following convictions:

First, that the country is rich in gold, and that it is merely a matter of the necessary time and scientific application for that gold to pay well for extraction; and

Second, that earnest and well-considered attempts are now being made to insure success.

In a paper on the "History, trade, resources, and present condition of the Gold Coast Settlement," which Mr. Hesketh J. Bell, F. R. G. S., assistant treasurer of the Gold Coast, read on May 1, 1893, before the Liverpool Chamber of Commerce, he says on the subject of gold mining:

"It is impossible in the limits of a paper such as this to go fairly into the merits and prospects of gold mining on the West Coast of Africa. If the Gold Coast possessed a climate no worse than that of Australia or South Africa the question would long ere this have solved itself and a rush to the West African gold fields would have happened very many years ago. I doubt very much whether California itself ever presented to the naked eye the tempting wealth of gold which so forcibly attracts the attention of the traveler in the western districts of the Gold Coast. All along the seaboard from Cape Coast Castle to Appolonia the native women may be seen washing the sand of the seashore and obtaining a considerable amount of gold therefrom. Every stream in Ahanta possesses rich auriferous deposits, and all over the country quartz reefs crop out in the surface soil, giving good promise of great wealth lying at a little depth below. The reports of every competent person who visits these districts confirms the statement that gold is to be found in abundance."

The following table shows the exports of gold irrespective of gold specie from the Colony since 1885:

Year.	Weight.		Value.		
	Ounces.	*Ack.**	£	*s.*	*d.*
1886	20,799	1 0	74,828	17	0
1887	22,546	12 $4\frac{2}{3}$	81,168	9	5
1888	24,030	10 $0\frac{1}{3}$	86,510	5	2
1889	28,666	12 $5\frac{1}{9}$	103,200	9	10
1890	25,460	4 $3\frac{3}{4}$	91,657	0	10
1891	24,475	9 3	88,112	2	9
1892	27,446	1 1	98,805	17	3
Total	173,425	3 $5\frac{31}{36}$	624,283	2	3

* An ack is one-sixteenth of an ounce.

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[1] Colonial Report No. 66 of 1889 (C5620–5624), August, 1889.

ARGENTINE REPUBLIC.

The United States minister to Buenos Ayres, Hon. William J. Buchanan, advises this Bureau, under date of May 1, 1895, that the production of gold, as he had been informed by the Argentine department of mines, was, in 1894, 143 kilograms and of silver 37,334 kilograms, of the coinage values, respectively, of $95,038 and $1,551,601.

The Argentine Republic possesses, according to the information furnished by Rickard, Stelzner, and Brackebush, a large number of beds of deposit, among them numerous beds of gold and silver.

The imperfect roads of the country and the lack of capital and labor have hitherto prevented the development of any large and permanent industry in that country. Notwithstanding these difficulties, however, individual companies operate and work the silver and copper mines of the Famatina Mountains, in the province of La Rioja, and the gold and silver and copper mines of Capillitas, in the province of Catamarca. Some alluvial gold is also found.

AUSTRALASIA.

This Bureau is indebted to the Hon. George Anderson, deputy master of the royal mint, Melbourne, for a continuance of his courtesy in furnishing it with information regarding the yield of gold and silver in 1894. He writes:

MELBOURNE, *March 4, 1895.*

SIR: I have the honor to inclose a statement showing the quantity of gold and silver produced in Australasia during 1894, according to the estimates furnished by the Governments of the various Colonies, expressed, as usual, in gross ounces.

I have forwarded a similar return to the consul-general for the United States in Melbourne in order that he might, should he see fit, transmit it to Washington by telegram for your information.

I have the honor to be, sir, your obedient servant,

GEORGE ANDERSON.

DIRECTOR OF THE MINT, *Washington, D. C.*

APPROXIMATE PRODUCTION OF GOLD AND SILVER IN AUSTRALIA, TASMANIA, AND NEW ZEALAND DURING THE YEAR 1894.

Colony.	Gold.	Silver.
	Ounces.	*Ounces.*
New South Wales	324,787	[1]846,822
New Zealand	221,533	54,177
Queensland	675,000	163,410
South Australia	[2]35,844	....
Tasmania	57,873	(1)
Victoria	673,680	[3]50,909
West Australia	207,131	....
Total	2,195,848	1,115,318

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[1] In addition, silver-lead and silver ore were raised, the quantities being for 1894: Tasmania, 20,572 tons; New South Wales, 180,326 tons, of a value of £2,195,339.

[2] Quantity received at Melbourne and Sydney mints.

[3] Extracted from gold at Melbourne mint.

It has been established by assays made at the Melbourne mint that Australian gold bullion contains on an average 95 per cent of pure gold. Besides this, a deduction of 2½ to 3 per cent must be made from the above amounts for loss in the melting of alluvial gold. Making the reduction indicated, a total of 8 per cent, the amount of pure gold produced in Australasia in 1894 is found to be 2,020,180 ounces, or 62,836 kilograms, representing $41,760,827, an increase over 1893 of 9,138 kilograms, or $6,072,200.

As shown above, Australia produced in 1894, 1,115,318 ounces, fine, silver, and silver lead and silver ore of the value of £2,195,339, or $10,683,617. At the average price of pure silver during the year, $0.63, this value represents 16,958,122 ounces of pure silver, which, added to the 1,115,318 ounces of silver bullion, gives a total silver product of the colonies in 1894 of 18,073,440 ounces, or 562,263 kilograms, of the coining value of $23,367,680, at which figures it appears in the table of the world's production of gold and silver in the present report.

The gold product of Australasia in 1894 was greater than that of 1893 by 319,286 ounces, crude, or 293,743 ounces, fine, representing a value of $6,072,207.

The gold product of West Australia, which in 1893 was 110,890 ounces, crude, was in 1894, 207,131 ounces, crude, an increase of nearly 100 per cent.

The production of silver in Australasia in 1894 shows a decrease of 75,537 kilograms, representing $3,139,318.

Under date of August 10, 1894, Mr. Daniel W. Maratta, consul-general of the United States at Melbourne, sent a report to the State Department on mining in Australasia, and from it is extracted the following relating to the gold and silver output of the Australasian Colonies.

MINING INDUSTRIES OF AUSTRALASIA.

In consequence of the recent gold discoveries in the colony of West Australia, this consulate-general has been besieged with letters of inquiry from residents of California, Colorado, Nevada, and other mining States with reference to the advisability of the writers coming here. I therefore deemed it best to prepare the following report upon the mining industries of this continent in answer to such inquiries:

"There is a good opportunity here for miners from the United States well versed in the best methods of obtaining gold, but it is absolutely necessary that they come well provided with both funds and experience; with sufficient of the former to last them at least six months, irrespective of what gold they may obtain. The machinery and appliances in vogue here are not altogether the latest and best—in many cases they are quite obsolete. If some of our large manufacturers of mining machinery and appliances would send representatives out to these colonies it would, in my opinion, well repay them."

VICTORIA.

The chief products of the colony of Victoria are minerals and wool. Previous to the year 1876 the value of the former was far in excess of the latter, but since that date, owing to the decreased yield of gold, the value of the wool clip has been gradually gaining ground. In 1892 there were 80,505,334 pounds of this staple produced in Victoria, the value of which was $17,616,655.98, while the yield of gold for 1893 was 671,126 ounces, which, being computed at $19.48 per ounce, gives a value of $13,073,534.48. The total yield of gold for the colony of Victoria, taken from the returns from 1851, the year of the discovery, to the end of 1893, has been 58,772,555 ounces, valued at $1,134,888,371.40, but there is every reason to believe that the yield has been much greater.

Between 1851 and 1884 no official record was kept beyond that of the local registrars, and the estimates, so far as the earlier years are concerned, are based chiefly on the returns of gold exported from the colony, inclusive of 1,267,241 ounces which, according to the tables of the registrar-general, were raised in Victoria from 1852 to 1855, but passed through the customs of New South Wales, Tasmania, and South Australia. A small quantity of gold was manufactured into jewelery in the colony during the years referred to. Gold was brought down to Melbourne by lucky diggers, who never reported the quantity or value, but took it with them to Europe in belts around their bodies. The *Royal Charter*, which was wrecked off the British coast, had on board a number of these miners as passengers, and on the bodies washed ashore were found thousands of ounces of gold.

The value of gold per working miner, of course, varies according to the number of men on the various fields. The minimum was $330.40 per head in 1876, and the maximum, $529.79 in 1885, which was brought about by the large discoveries on the alluvial fields.

The largest field of alluvial gold in the colony is the Creswick and Kingston district, located from 113 to 115 miles from Melbourne, where there is one continuous lead of 7 miles in length which has been and is still being worked. Here the subterranean stream is raised, puddled, and sluiced off in the ordinary sluice boxes, the average depth of shafts being from 350 to 450 feet.

An old field is now being worked with great success at Rutherglen, where dry leads are being opened, the water having beaten the miners in the early days.

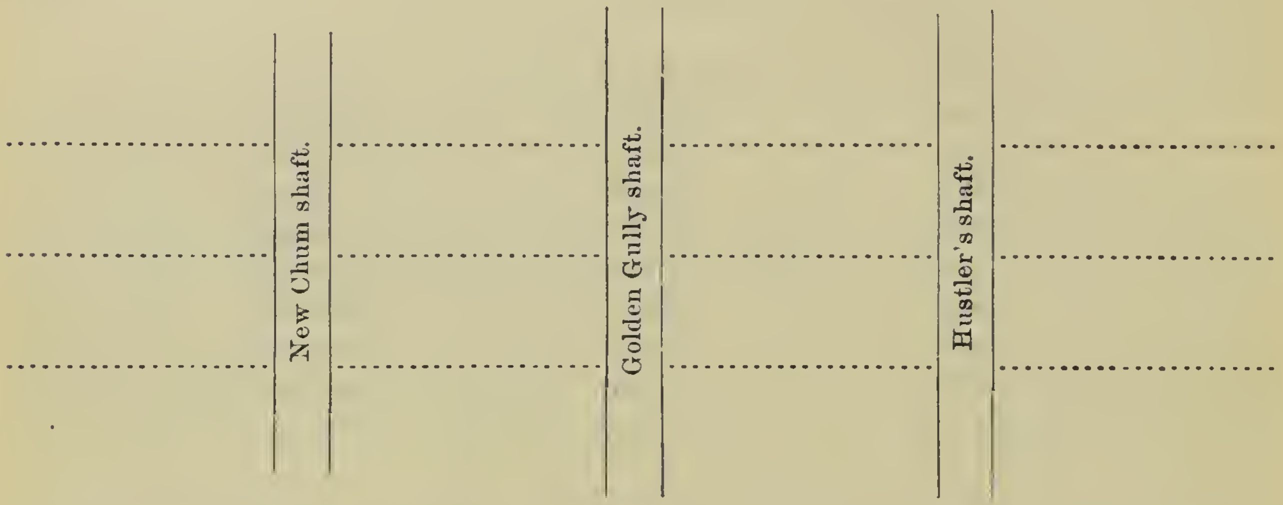
In the mountains of Omeo and in the northeastern part of the colony the hills are sluiced away by giant nozzles, which is the same method as that pursued by the California miners. During the past two years, owing to the terrible depression in all branches of business, thousands of men have been thrown out of employment and have been compelled to turn their attention to mining, and many new and paying discoveries have been made, among which may be especially mentioned the alluvial finds in Gippsland and other eastern provinces. This part of the colony has been very little worked, as gold was unknown in this district during the early days of mining.

Quartz mining.—The bulk of the gold raised during the past five years was obtained from quartz and ironstone matrices, Bendigo and Ballarat being the largest fields.

In this connection it may be interesting to mention the ten mines having the deepest shafts in Victoria:

Mine.	Depth.	Mine.	Depth.
Bendigo:	*Feet.*	Bendigo—Continued.	*Feet.*
Lansell's 180 mine	3,000	Victoria and Pandora Co	2,500
New Chum and Victoria Co	2,800	Carlisle Co	2,485
New Chum Consolidated Co	2,632	Victoria Consols Co	2,482
Lazarus Co	2,595	New Chum United Co	2,396
New Chum Railway Co	2,533	Stawell—Magdala Co	2,409

Sinking or driving here is not so rapid as in the United States, owing to the fact that the ground is hard and difficult to work and the appliances used are not the latest inventions. If some of the improved machinery used in the California and Nevada mines could be imported into Victoria, the yield here could be materially increased, and I would draw the attention of our manufacturers of mining machinery to this market. A new plan of mining has recently been decided upon in the Bendigo district, where the reefs are of saddle formation, and run in three different lines, thus:



As the gold at great depths has decreased, it is now intended to come up to the higher levels and crosscut the intervening country, as shown by the dotted lines.

New discoveries.—In the Snow country, about 200 miles northeast of Melbourne, new discoveries of a mineral stone have recently been made at a depth of from 70 to 80 feet. The ironstone turns to a pyritous formation, which prevents the saving of gold by the ordinary crushing process. Chlorination and concentrating works are now being erected in the district.

The following are the returns for the year 1893 from some of the principal quartz mines:

Mine.	Ounces.	Mine.	Ounces.
Star of the East Co., Ballarat	22,216	Black Horse United Co., Egerton	10,650
Johnson's Reef Co., Eaglehawk	21,327	South German Co., Maldon	9,962
Long Tunnel, Walhalla	19,291	United Hustlers and Redan Co., Bendigo.	8,924
Princess Dagmar Co., Eaglehawk	16,350	New Mariners' Co., Steiglitz	8,192
New Red, White, and Blue, Eaglehawk	13,474	Last Chance United Co., Ballarat	7,923
Long Tunnel Extended Co., Walhalla	12,442	Lord Nelson Co., St. Arnaud	7,747

The following are the largest yields reported from the leading alluvial mines during the year:

Mine.	Ounces.	Mine.	Ounces.
Berry Consols Co., Smeaton	20,398	Berry No. 1 Co., Smeaton	8,003
Madam Berry Co., Smeaton	16,103	Great Northern Co., Rutherglen	7,750
Great Northern Extended Co., Rutherglen	11,017	Prentice Freehold Co., Rutherglen	7,033
Madam Berry West Co., Smeaton	9,681	Chalk's Freehold Co., Craigie	6,968

During the year $2,843,755.26 were paid in dividends by mining companies throughout the colony, being a decrease of $177,526.72 on the amount paid during 1892. The following are the amounts paid in each mining district:

District.	Amount.	District.	Amount.
Sandhurst	$1,030,599.38	Castlemaine	$201,028.73
Ballarat	1,001,734.65	Ararat	80,498.09
Beechworth	248,233.64	Maryborough	69,319.58
Gippsland	212,137.20		

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At the end of the year there were 25,519 men employed in gold mining, being 2,001 more than were at work in 1892; included in the number are 241 Chinese.

During the year, owing to the financial depression, a great number of young men have applied to the mining department for advice as to how to conduct mining operations. Many of these are wholly unused to digging for gold, and for the assistance of such Mr. R. A. F. Murray, F. G. S., Government geologist, has written a number of suggestions, which have been issued by the Hon. H. J. H. McColl, minister of mines. Some of the hints may be of use to intending miners in the Western States. I append a few extracts:

"Recent discoveries from time to time in Victoria have shown how easily accessible gold resources are, far from exhausted, and, speaking from a general knowledge of the gold fields such as few possess, I adhere to the opinion that properly directed labor will lead to further valuable developments over the whole length and breadth of our auriferous areas.

"As these remarks are intended mainly for the inexperienced and possibly poor men who are now trying their luck at digging, to whom deep sinking in wet ground would be impracticable, and who want to get a little gold for subsistence as quickly as possible in easily worked ground, I may be excused for giving suggestions that are thoroughly familiar to anyone who has worked even a short time upon the gold fields. In shallow ground—that is, where silurian rocks are close to the surface and the alluvial deposits resting on them are thin—gold is principally found in the gullies and flats, or in layers of gravel, rubble, etc., on the slopes, and sometimes in the surface material on the hillsides. As a rule, the gold is found in the stuff resting immediately on the silurian bedrock or bottom, whether it be a few inches or many feet below the surface, and it is, therefore, usually necessary to reach this 'bottom' before gold can be expected. A very brief inspection of old workings will soon enable the veriest tyro to recognize the character of the bedrock and to know when he reaches it in sinking.

"It is recognized beyond dispute that alluvial gold was derived from the wearing down of vast quantities of rock containing auriferous quartz reefs or veins. The gold contained in the rock so denuded or worn has been more or less concentrated in the gravelly or rubbly deposits in gullies, creeks, river beds, flats, terrace gravels, leads, etc., but in the rocks which remain there also exist the unremoved downward continuations of the quartz reefs, lodes, veins, etc., which were the sources of the alluvial gold supply. It may be taken as a general rule, as regards Victorian gold fields, that wherever alluvial gold had been found there must exist in the silurian bedrocks of the locality the continuation of the quartz reefs, of which the removed or degraded upper portions furnish the alluvial supply; and, great as has been the development of quartz mining in the past, the actual length of lines of auriferous reef so far discovered is very small compared with the extent of the worked alluvial ground, and as free gold, owing to the weight, will not travel very far, it follows, as a general principle, that where rich alluvial gold has been found and no quartz reefs have yet been developed, it is simply because these reefs remain to be discovered—not that they do not exist. I would therefore advise energetic prospecting for these reefs on any field where alluvial gold has been found in the past; and the first thing the prospector has to find is where that alluvial gold started from, which he can do by observing the old workings, or where it became suddenly more plentiful as followed down; also to be learned from the appearance of the old workings or from local tradition.

"These are the places where the adjacent hillsides should be most carefully explored for reefs or veins. The covering of surface soil and clay on the bedrock is sometimes an impediment, though most usually not very thick, especially on all the great western fields, but the process known as 'loaming' is an excellent method preliminary to trenching or sinking. This consists of taking surface prospects along the slopes of the hills wherever a little scattered quartz can be seen in the soil, noting the localities, and washing the samples. If a speck or so of gold can be found at one or more places, the next step is to return thither and take more prospects at closer intervals, working gradually uphill, until no more gold can be found. Where the gold ceases is usually near and above the reef or vein whence it was derived, and it is here that more exhaustive search should be made by trenching or 'costenning' through the soil a short distance into the underlying bedrock in search of the quartz. 'Indicators' or small veins of pyrites, ironstone, and often thin bands of peculiar slate, intersected by small quartz veins, should also be carefully looked for. For instance, the prospector, after an inspection of a tract of country worked in the past for alluvial gold, finds a certain line up to, but not beyond, where the old workings extend. The natural inference is that adjacent to such line must lie the reef which supplied the gold. He then proceeds to take 'loam' prospects along that line, but at first well on the down side of it, and as described before.

"When he finds specks of gold he traces them uphill to where they cease, and then searches for the reef, vein, lode, or 'indicator.' Some men have a peculiar faculty for this style of prospecting, and many good reefs have been found by its means, and it is generally applicable to all the rangy silurian country in which alluvial gold deposits have been found. There are, of course, many localities in which quartz reefs can be seen outcropping on the surface, and have been more or less prospected without results, even in good alluvial fields; but it is not always the most prominent reef that contains the gold—just as often some unnoticed vein, or one concealed by a covering of surface soil, or an indicator. No reef should be regarded as worthless because a few trials have yielded no results. Gold in reefs occur in 'shoots,' and once a line of reef is found which appears to be a possible source of supply, it should be followed along its course and tested at many short intervals for a considerable distance, according to the position of the old alluvial workings which head from it.

"A very common mistake, even among experienced miners, is to waste time and labor in sinking on reefs before proving the existence of gold in them. It may be laid down as a rule that if a reef is at all auriferous gold will be found somewhere along its outcrop, and until this is met with there is no use in sinking any considerable depth. I do not know of any auriferous reef in Victoria where gold is not, in the first instance, found at the surface but was subsequently found at depth. By 'surface' is here meant the silurian bedrock, whether covered or not by alluvial deposits.

"As a final piece of advice, follow the gold when found, trace it patiently by close prospecting up to its source, and take note of every particular quartz vein or band in the silurian rock with which the gold seems to be associated. Should a loose piece of quartz be found, observe carefully the stone and search upward for the reef or vein it came from."

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SOUTH AUSTRALIA.

This colony is not so rich in minerals as either Victoria or New South Wales, the chief product being copper.

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Gold.—This mineral has been found at and around Echunga, 21 miles southeast of Adelaide, and during the year 1881, some rich specimens were discovered at Woodside. In 1886, alluvial gold was found on the Tutulpa Run, 230 miles northeast of Adelaide. During the year 1892, 6,596 ounces were raised, valued at $107,092.39.

Silver.—A few silver mines have been found in the southern part of South Australia, near Cape Jervis, but the discovery of silver at Broken Hill, in New South Wales, although outside the territory of the colony, is having an important influence on the commercial prosperity of South Australia, as this colony being the nearest shipping port, the mines naturally ship their exports, as well as draw their chief supplies, from this source. As the same formation extends within the South Australian border, it is not unreasonable to expect that valuable mines will be discovered in this colony, as already silver has been found in paying quantities.

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WEST AUSTRALIA.

Until quite recently this colony was considered to be destitute of mineral deposits of any value, with, perhaps, the exception of the rich deposits of lead and copper in the North Hampton district, which were found and worked in the early days. Recent discoveries have, however, indicated that this is a rich gold-bearing colony, as nearly every day fresh discoveries of gold are coming in.

Toward the close of the year 1887 gold was found by Mr. H. E. Anstey on the Vilgarn Hills, about 200 miles east of Perth, and the Government geologist prophesies that it will in time become one of the richest fields in Australia, as the reefs, which extend in all directions, are gold bearing and improve with depth, the chief difficulty being scarcity of water for mining purposes; but steps are now being taken by the Government to conserve the water on the different gold fields, which, I trust, will meet with success.

In August, 1892, a rich discovery was made by a man named Bailey at a place called Coolgardie, 100 miles east of Southern Cross, who raised 600 ounces of magnificent specimens of gold. This naturally caused a rush to the district, but lack of water drove many away. Nuggets ranging from 12 to 60 ounces were frequently found. Six men working for four weeks on the Bailey's Reward claim, with the use only of the roughest tools, raised 2,500 ounces of gold, which is valued at $48,700. This gold was lodged at the Union Bank of Perth and was visited by many mining experts.

Although it is impossible to form any decided opinion in regard to the permanency of the Coolgardie gold fields, as the shafts are only from 9 to 15 feet deep, it is the opinion of geologists that the precious metal will be found at greater depths.

The following comparative returns for 1891 and 1892 have been issued by the commissioner of customs, and may be of interest as showing the increased output of gold for twelve months:

Year.	Quantity.			Value.
	Oz.	*dwt.*	*gr.*	
1891	30,311	1	9	$560,936.34
1892	59,548	6	4	1,102,000.99

NEW SOUTH WALES.

This colony produces a greater variety of minerals than any other in Australasia, as will be seen by the following table of the quantities and the value of the same produced in the year 1892:

Description.	Quantity.	Value.
Silver .... ounces..	350, 661	$277, 025. 08
Silver lead and ore .... tons..	133, 354	11, 790, 036. 24
Coal .... do....	3, 780, 968	7, 121, 829. 56
Gold .... ounces..	156, 870	2, 771, 891. 19
Tin and tin ore .... tons..	3, 492	1, 529, 735. 18
Copper and regulus .... do....	4, 834	934, 128. 22
Shale .... do....	74, 197	662, 704. 73

Until recently the chief product of the colony was coal, but since the discovery of the celebrated Broken Hill mine the value of silver reported is nearly twice that of coal. For many years silver has been raised from mines in Sunny Corner; also in what is known as the New England district of New South Wales, but it was not until 1883 that any extensive discoveries were made. In September of that year Charles Rasp, an employee on the Mount Gipps sheep run, in the western part of the colony, while mustering sheep on what is known as the Broken Hill paddocks of this run, was struck with the mineral appearance of the surface. Rasp, a well-educated German, after further examination, concluded to communicate with Mr. George McCulloch, who was at that time manager and part owner of the run. He stated to him that he believed the bluff at the end of the hill was a mass of tin. Together they pegged off blocks which are now leases Nos. 13, 14, and 15, which include Broken Hill itself. In conjunction with Messrs. Pool & James, contractors on the run, Rasp secured block No. 12. These blocks were applied for in the names of George McCulloch, George Urquhart, and C. A. M. Lind. Two more blocks, now 10 and 11, were applied for to the south of No. 12 and one block to the north of No. 15. Seven blocks were then secured, being nearly 2 miles in length on the line of the body. The interest in those seven blocks was amalgamated into one private company, known as the Broken Hill Mining Company. Toward the end of 1884 the existence of "chlorides" was discovered in Rasp's shaft, and from that date the prosperity of the mining company was assured, and on the 12th of August of the following year the Broken Hill Mining Company was floated into the Broken Hill Proprietary Company, Limited, with a capital of $1,558,400, of which $87,660 were paid in cash by the contributing shareholders. After this capital had been paid in a very valuable deposit of ore was struck, and a large quantity has since been taken from this part of the mine. The first 50 tons of this ore were sold to a smelting company in Melbourne and yielded to the company a net return of $36,525, so as a matter of fact the cash capital was not required, nor has the company asked the shareholders any advance whatever.

The lode varies in breadth from 2 to 300 feet; its depth is unknown, the deepest shaft being now a little over 800 feet. A new shaft is being sunk to work a depth of 3,000 feet. At the present time 3,352 men are employed at Broken Hill, and the wages paid for six months ending May 31, 1894, amounted to $1,411,624.81. The at gross value of silver and lead for six months ending May 31, 1894, if estimated the present market value, will amount to $6,132,378.43. The company, after paying in dividends, since the formation in 1885, $24,038,220 and cash bonuses amounting to $2,199,920, have a reserve fund of $608,750. Besides the large smelting works at Broken Hill, the company have additional works at Port Pirie, in South Australia, which is also the shipping and receiving port. The Broken Hill silver mines are undoubtedly the most valuable in the world.

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Gold.—This precious metal was first discovered by Edward Hargraves, in 1851, since which date it has been discovered principally in the interior of the colony, west of the Blue Mountain range. The number of men employed approximates to 11,166, of whom 708 are Chinese. The average yield from quartz is 18 pennyweights 13 grains, and from wash dirt 9 pennyweights 10 grains to the ton.

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QUEENSLAND.

Gold.—Gold is the most valuable mineral to be found in this colony. The first discovery was made at Caroona, about 35 miles from Rockhampton, in July, 1858, though as early as 1853 Mr. Stuchbury, the government geologist of New South Wales, is reported to have found gold in small quantities near Port Curtis. No further important discoveries were made until the year 1867, when the Queensland Government offered rewards varying from $974 to $4,870 for the discovery of new gold fields, which naturally stimulated prospecting, and a number of valuable reefs were found. During the earlier part of the year a large nugget weighing 100 pounds and valued at $19,480 was unearthed at Gympie, 120 miles from Brisbane. This led to the discovery of the celebrated Gympie mines, the quartz here being very rich, and numerous claims are profitably worked. There are at the present time about twenty-two gold fields in the colony, the greater number of which are located on or near the coast. The extent of the alluvial and quartz ground worked covers an area of 14,028 square miles, and the number of miners employed on these fields, inclusive of 641 Chinese, is 9,306. The Chinese devote their attention almost exclusively to alluvial mining.

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Silver and silver-lead.—A small quantity of this mineral has been found in the Ravenswood and Bowen districts.

TASMANIA.

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Gold.—The first payable gold was found in 1852 near Fingal. About the same time it was discovered in minute particles in the vicinity of Nine Miles Springs, now known as Lefroy. In June, 1877, the celebrated quartz reef now known as the Tasmania gold mine, Beaconsfield, was discovered by Mr. William Dally. Other reefs have been more recently found in this district, from which gold has been raised in paying quantities, the yield being from 1 ounce 5 pennyweights 6 grains to the ton in 1882 to 1 ounce 4 pennyweights 21 grains in 1890. The total quantity of gold raised in Beaconsfield from 1866 to 1890, inclusive, was 330,530 ounces, or over 56 per cent of the total yield of the colony. The other important mines are the New Native Youth and Pinafore, at Lefroy; New Golden Gate, at Mathinna, and a number of mines on the east coast of the island, which have not been fully developed.

Silver and silver-lead.—A number of rich deposits of this mineral have been found on the west coast of the island. Ore has been found at intervals in over some 30 square miles of country, but the field has not yet been thoroughly tested at a depth. The principal fields are the Mount Zeehan, Mount Dundas, Hazlewood, and Whyte River districts, the most important mines being the Western, Silver King, and Mount Lyell.

PARTICULARS OF GOLD MINING IN VICTORIA IN 1893.

[From the report of A. W. Howitt, secretary of mines of Victoria.]

It is satisfactory to be able to report the improvement in our yield of gold which I noted in my last annual report has continued, resulting in an increase upon the output of the year 1892 of over 16,670 ounces. Progressive work is being done in mining centers in all parts of the colony. Attention has been turned to old gold fields where years ago rich quartz was mined, but which have been neglected, and in some cases, indeed, almost forgotten. Gold fields which have been neglected because of the difficulty in separating the gold from the refractory ores or base metals which accompany it have been found to yield rich returns by the use of improved appliances and advanced methods of treatment. In addition to all this, a large amount of prospecting is being done in all parts of the colony, resulting in fresh discoveries being made from time to time.

In view of all the facts known to me, I may state my conviction that in all reasonable probability this increase will not only be maintained but will be exceeded. The future outlook, therefore, of the gold-mining industry is more cheerful than might perhaps have been anticipated, having in view the existing financial distress.

The deep alluvial leads of central Victoria, although worked, have not been developed to such an extent as might have been at first sight expected. It is known that there is an aggregate length of some 20 miles of leads which have never been traced by boring, and which lie more or less in belts of known auriferous country. The successful working of this great length of gold-bearing leads would not only add greatly to our annual yield of gold for very many years to come, but would afford employment directly and indirectly to thousands of people.

In the northeastern district great development has taken place in the leads trending toward Wahgunyah. The results have been satisfactory, and there is all appearance of the field extending.

A number of causes have cooperated in keeping back this branch of mining. Among these causes are the large amount of capital required to prove one such mine, the length of time before any returns can be expected, and in more than one instance the failure of the plant provided to cope successfully with the underground water, accidents to shafts, and unexpected poverty of the wash; but, in my opinion, above all, injury has been done by the selfish policy of neighboring mining companies who idly waited for the results from the pioneer mine, rather than assist to insure its success by contributing to the cost of working. I referred to this subject in my last annual report, and the reasons which caused me to recommend a certain course of action are as strong now as then.

The next subject to which I desire to refer in connection with our increasing yield of gold is the saving of fine gold which is now lost, and the treatment of the sulphides which are found to accompany gold, sometimes at the surface, almost universally at a depth, and in some districts in exceptional amounts. For years past this has been brought under notice, but never before has there been such clear evidence as now that the minds of mining men are earnestly directed not only to ascertain what the loss in reality is, but also how it occurs and in what manner it may be best prevented. It seems almost unnecessary to say that our mining men all know the amount of gold they win, but not one in a hundred—if so many—knows exactly the amount lost.

Last year I pointed out that one weak point in our manipulation was the absence of classification and sizing of mine material previous to treatment. I observe that here and there steps are now being taken to do this, and with satisfactory results. The establishment at Stalwell of the first plant designed to treat battery tailings on the Lührig system is a step in this direction, for the system is based upon the classification of the stuff. The attention to this subject during the past year at Maldon, Walhalla, Harrietville, Cassilis, and elsewhere shows that mining men are becoming aware of how important classification and sizing of material is toward success in treatment of battery stuff containing sulphides and gold.

The attention of the department has been fixed during the past year on the important consideration how steps could be best taken to arrest as much as possible the loss of gold which is continually going on. In order to decide upon the lines on which experimental work should be done, it became necessary to know with some precision the present position of gold saving in the colony, the conditions under which gold is being lost, and the appliances by which the best results are being obtained.

In addition to the work which Mr. J. Cosmo Newbery has carried out in the departmental laboratory in this connection, and which is noted in his report, the important work of investigation in the field has been intrusted to Mr. Henry Rosales, F. G. S., M. E., who has been long known to and trusted by the mining community. The field of inquiry covers the whole of the colony where gold mining is being carried on, and some of the principal places have already been visited by him, the most advanced gold-saving appliances studied, and an extensive series of samples taken, which have been assayed and reported upon by Mr. J. Cosmo Newbery. I have also visited and examined a number of localities to obain, personally, knowledge of the most recent methods adopted. So far as the inquiry has gone it shows conclusively that the loss of gold is considerable,[1] even when the best and most efficient appliances are used; and that, as had been anticipated, sizing of material will have to be one of the remedial measures. The results also indicate that good experimental work may be done by the department, and the preliminary steps in this direction are being taken. This inquiry is an extensive one, and can not be completed in a hasty manner. It is hoped, however, that during the current year a substantial advance may be made in our knowledge of this branch of mining.

Mr. Newbery, in his laboratory report, has pointed out how the trituration of gold causes loss, and it becomes evident that herein is in some measure the origin of "float gold." This observation opens up a wide field for experimental research, which will have to be explored to trace out the causes and devise a remedy.

The immense importance of the results which would follow a successful solution of the difficulty which is now experienced in saving fine gold will be readily seen when the amount of quartz crushed annually is considered. In the year 1893, 904,367 tons were operated upon. If methods were so far improved upon as to save one pennyweight per ton of the amount now lost, the annual addition to our gold yield would be 45,218 ounces 17 pennyweights, or at the mean value of the ore sold some £180,875 8s in value.

It was thought also necessary, in this connection, that some independent research should be made into the treatment of auriferous ores by the cyanide process. The preliminary work has been done by Mr. J. Cosmo Newbery, and it is now intended to set up a small plant for the purpose of carrying out further tests on a practical scale, and of large samples.

* * * * * * *

The laboratory report which is furnished by the analyst to the department will indicate some of the steps which are being taken in regard to gold saving, and arrangements are now under consideration by which the experiments made by Mr. Newbery in the laboratory will be tested practically and on a larger scale.

* * * * * * *

During the year ended December 31, 1893, the quantity of gold raised in the colony, according to the returns furnished by the mining registrars, amounted to 671,126 ounces 16 pennyweights 19 grains, which shows an increase of 16,670 ounces 4 pennyweights 13 grains when compared with the yield recorded for 1892. This is the largest yield reported for any individual year since 1885. The increase is due to alluvial mining, the yield from this source being 218,673 ounces 6 pennyweights 5 grains, an increase of 16,714 ounces 11 pennyweights 8 grains on the alluvial yield for previous year. From quartz operations 452,453 ounces 10 pennyweights 14 grains were obtained, being 44 ounces 6 pennyweights 19 grains less than the quartz yield for the previous year. The following are the results obtained in both classes of mining in the several mining districts during the year:

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[1] Probably from 3 to 15 pennyweights per ton.

District.	Alluvial.			Quartz.			Total.		
	Oz.	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*
Ballarat	83,421	12	16	124,395	10	3	207,817	2	19
Sandhurst	5,576	13	0	188,122	15	18	193,699	8	18
Beechworth	56,376	11	2	21,218	1	7	77,594	12	9
Castlemaine	25,118	16	22	40,335	7	12	65,454	4	10
Gippsland	7,309	5	12	46,057	15	18	53,367	1	6
Maryborough	30,241	0	12	19,941	15	21	50,182	16	9
Ararat	10,629	6	13	12,382	4	7	23,011	10	20

In the Gippsland, Beechworth, Castlemaine, and Ararat districts increased yields are shown, and in the Maryborough, Sandhurst, and Ballarat districts the yield shows a decrease in comparison with the returns for 1892.

The yields from alluviums and quartz reefs in each of the mining divisions are shown in statement No. 1, and the yields for each year from 1851 in statement No. 2.

The quantity of Victorian gold received at the Melbourne branch of the royal mint during the past year amounted to 693,218 ounces 16 pennyweights 4 grains, consisting of 114,236 ounces 3 pennyweights 4 grains of rough gold, and 578,982 ounces 13 pennyweights of gold bullion.

From the colony during the year the quantity of gold exported amounted to 23,074 ounces. In addition to this gold specie from all sources, valued at £2,445,187, was exported.

The amount of gold won from quartz mining during the year was 452,453 ounces 10 pennyweights 14 grains. From the mining registrars particulars were received of the crushing of 904,367 tons of quartz, which yielded 420,008 ounces 6 pennyweights 22 grains, giving an average of 9 pennyweights 6 grains per ton, which is not quite as high as that obtained from last year's crushings, 9 pennyweights 23 grains then being the average. The crushings reported in each district were as follows: Sandhurst, 391,651 tons; Ballarat, 304,017 tons; Castlemaine, 77,397 tons; Maryborough, 37,678 tons; Gippsland, 36,852 tons; Beechworth, 31,969 tons; Ararat, 24,803 tons. In Gippsland the highest average, viz, 19 pennyweights 1 grain of gold per ton of quartz crushed, was obtained. Of the individual crushings that have been brought under notice during the year, the following are those from which the best average yields were obtained:

(1) Nuggetty Gully Company, Creswick, crushed 1 hundredweight 28 pounds for a yield of 48 ounces; average, 768 ounces per ton.

(2) Inverell Company, Alexandra, crushed 7 hundredweight 16 pounds for a yield of 34 ounces; average, 95 ounces 4 pennyweights per ton.

(3) John Odell, Sandy Creek, crushed 1 ton 5 hundredweight for a yield of 44 ounces 10 pennyweights; average, 35 ounces 12 pennyweights per ton.

(4) Merry & Anderson, Porepunkah, crushed 5 tons for a yield of 145 ounces; average, 29 ounces per ton.

(5) Garry Owen Company, Alexandra, crushed 1 ton for a yield of 20 ounces; average, 20 ounces per ton.

(6) Cocking & Co., Bendigo, crushed 6 tons for a yield of 82 ounces 8 pennyweights; average, 13 ounces 14 pennyweights 16 grains per ton.

(7) Smith & Co., Maldon, crushed 34 tons for a yield of 462 ounces 15 pennyweights; average, 13 ounces 12 pennyweights 4 grains per ton.

(8) Carter & Son, Panton Hill, crushed 4 tons for a yield of 40 ounces 13 pennyweights; average 10 ounces 3 pennyweights 6 grains per ton.

(9) Great Southern Diorite Dike Company, Warrandyte, crushed 5 tons 10 hundredweight for a yield of 48 ounces; average, 8 ounces 14 pennyweights 13 grains per ton.

(10) Anderson & Bell, Upper Buckland, crushed 4 tons for a yield of 34 ounces; average 8 ounces 10 pennyweights per ton.

The following are the returns for the year from some of the principal quartz mines:

Company.	District.	Yield.
		Ounces.
Star of the East Co	Ballarat	22, 216
Johnson's Reef Co	Eaglehawk	21, 327
Long Tunnel Co	Walhalla	19, 291
Princess Dagmar Co	Eaglehawk	16, 350
New Red, White and Blue Co	do	13, 474
Long Tunnel Extended Co	Walhalla	12, 442
Black Horse United Co	Egerton	10, 650
South German Co	Maldon	9, 962
United Hustlers and Redan Co	Bendigo	8, 924
New Mariners Co	Steiglitz	8, 192
Last Chance United Co	Ballarat	7, 923
Lord Nelson Co	St. Arnaud	7, 747

The quantity of quartz tailings and mullock treated was 43,521 tons, which yielded 5,291 ounces 2 pennyweights 2 grains, and 14,314 ounces 11 pennyweights 4 grains were obtained from 5,507 tons of pyrites.

From alluvial mining 218,673 ounces 6 pennyweights 5 grains were obtained during the year. Information was furnished by the mining registrars as to the treatment of 983,992 tons of wash dirt for a yield of 71,590 ounces, an average of 1 pennyweight 9 grains per ton, and of 15,016 tons of cement, which yielded 2,422 ounces 1 pennyweight 2 grains.

The following are the largest yields reported from alluvial mines during the year:

Company.	District.	Yield.
		Ounces.
Berry Consols Co	Smeaton	20, 398
Madame Berry Co	do	16, 103
Great Northern Extended Co	Rutherglen	11, 017
Madame Berry West Co	Smeaton	9, 681
Berry No. 1 Co	do	8, 003
Great Northern Co	Rutherglen	7, 750
Prentice Freehold Co	do	7, 033
Chalk's Freehold Co	Craigie	6, 968

The average results of some of the crushings from parcels of quartz from the deep mines at Bendigo were as follows:

The New Chum and Victoria companies, from depths ranging from 2,000 feet to 2,200 feet, raised 95 tons, which averaged 1 ounce 4 pennyweights 21 grains per ton,

The North Shamrock Company, from depths ranging from 1,300 feet to 1,800 feet. raised 893 tons, which averaged 1 ounce 22 grains per ton.

The Great Central Victoria Company, from a depth of 2,115 feet, raised 230 tons, which averaged 17 pennyweights 4 grains per ton.

The Victoria Quartz Company raised 458 tons from a depth of 1,980 feet for an average yield of 12 pennyweights 16 grains per ton.

From a depth of 2,183 feet the Lazarus Company raised 3,800 tons, which averaged 10 pennyweights 10 grains per ton.

On December 31, 1893, the following were the ten deepest mines in Victoria:

Mine.	District.	Depth.
		Feet.
Lansell's 180 Mine	Bendigo	3,000
New Chum and Victoria Co	do	2,800
New Chum Consolidated Co	do	2,632
Lazarus Co	do	2,595
New Chum Railway Co	do	2,533
Victory and Pandora Co	do	2,500
Carlisle Co	do	2,485
Victoria Consols Co	do	2,482
Magdala Co	Stawell	2,409
New Chum United Co	Bendigo	2,396

STATEMENT NO. 1.—SHOWING THE YIELD OF GOLD FROM ALLUVIUMS AND QUARTZ REEFS IN THE SEVERAL DIVISIONS OF EACH MINING DISTRICT OF VICTORIA DURING THE YEAR ENDED DECEMBER 31, 1893, AS ESTIMATED BY THE MINING REGISTRARS.

District and division.	Alluvial.			Quartz.			Total.		
BALLARAT.	*Oz.*	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*
Central	2,890	2	23	86,320	6	7	89,210	9	6
Southern	3,534	7	4	229	19	14	3,764	6	18
Buninyong	435	0	0	1,835	2	17	2,270	2	17
Smythesdale	3,669	9	0	2,656	12	0	6,326	1	0
Creswick	70,660	3	16	1,137	0	16	71,797	4	8
Clunes	....			6,273	8	21	6,273	8	21
Gordon	430	0	0	13,461	8	6	13,891	8	6
Steiglitz	237	10	0	11,902	12	12	12,140	2	12
Blackwood and Blue Mountain South	1,491	13	5	578	19	6	2,070	12	11
Ballan	73	6	16	....			73	6	16
Total	83,421	12	16	124,395	10	3	207,817	2	19
BEECHWORTH.									
Beechworth	13,141	14	2	2,641	2	0	15,782	16	2
Yackandandah North[1]	....			....			....		
Yackandandah South	1,425	6	1	1,199	4	12	2,624	10	13
Indigo	35,338	16	12	999	2	17	36,337	19	5
Wandiligong	....			3,537	3	0	3,537	3	0
Buckland	2,227	0	0	5,175	3	0	7,402	3	0
Alexandra	596	0	9	808	7	2	1,404	7	11
Benalla	15	5	0	4	8	0	19	13	0
Dry Creek	21	14	0	418	6	0	440	0	0
Gaffney's Creek	91	18	18	1,876	7	18	1,968	6	12
Wood's Point	485	12	5	1,579	17	6	2,065	9	11
Big River	322	0	0	....			322	0	0
Jamieson	406	6	16	1,379	10	0	1,785	16	16
Mitta Mitta North	7	8	0	897	11	0	904	19	0
Mitta Mitta South	1,610	0	0	....			1,610	0	0
Corryong	151	9	11	126	4	0	277	13	11
Betnanga	....			150	0	0	150	0	0
Dark River	536	0	0	425	15	0	961	15	0
Total	56,376	11	2	21,218	1	7	77,594	12	9

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[1] No gold was raised during the year in this division.

STATEMENT No. 1.—SHOWING THE YIELD OF GOLD, ETC.—Continued.

District and division.	Alluvial.			Quartz.			Total.		
	Oz.	dwt.	gr.	Oz.	dwt.	gr.	Oz.	dwt.	gr.
SANDHURST.									
Sandhurst	3,100	0	0	91,580	11	18	94,680	11	18
Eaglehawk	700	0	0	93,877	4	10	94,577	4	10
Kilmore	129	0	0	166	13	0	295	13	0
Heathcote	996	15	0	759	3	14	1,755	18	14
Rushworth	650	18	0	1,739	3	0	2,390	1	0
Total	5,576	13	0	188,122	15	18	193,699	8	18
MARYBOROUGH.									
Maryborough	10,538	0	0	7,260	3	9	17,798	3	9
Carisbrook[1]									
Majorca	6,669	1	0				6,669	1	0
Amherst	2,280	19	4	906	10	11	3,187	9	15
Avoca	4,836	6	19	112	18	0	4,949	4	19
Dunolly	2,766	18	2	369	7	12	3,136	5	14
Tarnagulla	374	0	0	138	15	5	512	15	5
Inglewood	975	5	0	804	4	0	1,779	9	0
Wedderburn	546	12	0	766	4	20	1,312	16	20
Redbank	288	5	10	3	10	0	291	15	10
St. Arnaud North	607	8	2	9,580	2	12	10,187	10	14
St. Arnaud South	358	4	23				358	4	23
Total	30,241	0	12	19,941	15	21	50,182	16	9
CASTLEMAINE.									
Castlemaine	5,145	1	9	1,839	10	11	6,984	11	20
Fryer's Creek	2,345	5	12	63	7	3	2,408	12	15
Daylesford	6,353	15	10	8,023	13	19	14,377	9	5
Taradale and Kyneton	3,605	18	0	8,589	3	0	12,195	1	0
Tarrangower	5,744	11	19	21,256	17	13	27,001	9	8
St. Andrew's	1,688	6	0	553	2	6	2,241	8	6
Blue Mountain North	235	18	20	9	13	8	245	12	4
Total	25,118	16	22	40,335	7	12	65,454	4	10
ARARAT.									
Ararat	1,228	6	13	32	4	7	1,260	10	20
Pleasant Creek	1,370	0	0	12,350	0	0	13,720	0	0
Barkly	605	0	0				605	0	0
Raglan	7,426	0	0				7,426	0	0
Total	10,629	6	13	12,382	4	7	23,011	10	20
GIPPSLAND.									
Omeo	1,342	19	0	9,659	6	0	11,002	5	0
Mitchell River	1,325	0	0	370	0	0	1,695	0	0
Boggy Creek	1,125	0	0	404	3	0	1,529	3	0
Crooked River	79	10	9	284	1	18	363	12	3
Dargo	300	0	0	245	0	0	545	0	0
Jericho	910	12	0	1,329	0	0	2,239	12	0
Donnelly's Creek	820	0	0	681	8	0	1,501	8	0
Stringer's Creek	250	0	0	32,007	14	0	32,257	14	0
Russell's Creek	263	13	0	9	0	0	272	13	0
Bendoc	373	0	0	420	1	0	793	1	0
Orbost	220	0	0				220	0	0
Tarwin	222	11	3	132	10	0	355	1	3
Haunted Stream	77	0	0	515	12	0	592	12	0
Total	7,309	5	12	46,057	15	18	53,367	1	6
Grand total	218,673	6	5	452,453	10	14	671,126	16	19

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[1] No gold was raised during the year in this division.

STATEMENT NO. 2.—SHOWING THE TOTAL ESTIMATED YIELD OF GOLD FOR THE COLONY OF VICTORIA FOR EACH YEAR SINCE THE COMMENCEMENT OF MINING IN THE COLONY (1851) UP TO DECEMBER 31, 1893.

Year.	Ounces.	Year.	Ounces.
1851	212,899	1874	1,097,643
1852	2,286,535	1875	1,068,417
1853	2,744,098	1876	963,760
1854	2,218,483	1877	809,653
1855	2,819,288	1878	758,040
1856	3,053,744	1879	758,947
1857	2,830,213	1880	829,121
1858	2,596,231	1881	833,378
1859	2,348,703	1882	864,610
1860	2,224,069	1883	780,253
1861	2,035,173	1884	778,618
1862	1,730,201	1885	735,218
1863	1,694,819	1886	665,196
1864	1,622,447	1887	617,751
1865	1,611,554	1888	625,026
1866	1,546,948	1889	614,838
1867	1,501,446	1890	588,560
1868	1,684,918	1891	576,399
1869	1,544,756	1892	654,456
1870	1,304,304	1893	671,126
1871	1,368,942	Total	58,772,555
1872	1,331,377		
1873	1,170,397		

NOTE.—In the earlier years of the gold-mining industry no proper official record was kept of the amount of gold raised annually in the colony, and the above estimates, so far as these years are concerned, are based chiefly on the returns of gold exported from the colony, and inclusive of 1,267,241 ounces, which, according to the registrar-general's tables, were produced in Victoria in 1852-1855, but passed through the customs of New South Wales, Tasmania, and South Australia. A small quantity of gold was also manufactured into jewelry, etc., in the colony during the years referred to.

The total value of the output was £235,090,220.

NEW SOUTH WALES.

[From the Report of the Department of Mines and Agriculture, New South Wales.]

DETAILS OF THE PRODUCTION OF GOLD IN 1893.

The output of gold from the opening of our gold fields to the end of 1893 amounts to 10,709,610 ounces, valued at £39,853,941 10s. 10d. The quantity won last year was 179,288 ounces, valued at £651,285 15s. 8d., being the largest output of any year since 1875. No doubt this satisfactory result is due somewhat to the large number of unemployed men assisted to the gold fields as fossickers, and to the important discoveries made from time to time by parties aided out of the prospecting vote. It affords me much pleasure to note that some of the discoveries made toward the end of the year appear to give promise of a moderate revival in gold mining, and to justify the belief that our output of gold for 1894 will exceed that of the past year. If my anticipations in this direction should be realized, it is possible that the trouble in regard to our own unemployed will be to some extent solved, but unfortunately our efforts to help them have, I fear, had the effect of attracting the unemployed from other colonies to this.

TABLE SHOWING THE QUANTITY AND VALUE OF GOLD WON IN THE COLONY OF NEW SOUTH WALES FROM 1851 TO 1893.

Year.	Quantity.	Value.		
	Ounces.	£	*s.*	*d.*
1851	144, 120	468, 336	0	0
1852	818, 751	2, 660, 946	0	0
1853	548, 052	1, 781, 172	0	0
1854	237, 910	773, 209	0	0
1855	171, 367	654, 594	0	0
1856	184, 600	689, 174	0	0
1857	175, 949	674, 477	0	0
1858	286, 798	1, 104, 174	12	2
1859	329, 363	1, 259, 127	7	10
1860	384, 053	1, 465, 372	19	9
1861	465, 685	1, 806, 171	10	8
1862	640, 622	2, 467, 779	16	1
1863	466, 111	1, 796, 170	4	0
1864	340, 267	1, 304, 926	7	11
1865	320, 316	1, 231, 242	17	7
1866	290, 014	1, 116, 403	14	5
1867	271, 886	1, 053, 578	2	11
1868	255, 662	994, 665	0	5
1869	251, 491	974, 148	13	4
1870	240, 858	931, 016	8	6
1871	323, 609	1, 250, 484	15	11
1872	425, 129	1, 643, 581	16	11
1873	361, 784	1, 395, 175	8	7
1874	270, 823	1, 040, 328	13	6
1875	230, 882	877, 693	18	0
1876	167, 411	613, 190	7	9
1877	124, 110	471 418	4	4
1878	119, 665	430, 033	2	7
1879	109, 649	407, 218	13	5
1880	118, 600	441, 543	7	7
1881	149, 627	566, 513	0	0
1882	140, 469	526, 521	12	5
1883	123, 805	458, 508	16	0
1884	107, 198	395, 291	12	5
1885	103, 736	378, 665	0	3
1886	101, 416	366, 294	7	7
1887	110, 288	394, 578	16	3
1888	87, 503	317, 099	12	0
1889	119, 759	434, 070	8	4
1890	127, 760	460 284	16	2
1891	153, 336	558, 305	12	3
1892	156, 870	569, 177	17	4
1893	179, 288	651, 285	15	8
Total	10, 736, 592	39, 853, 941	10	10

I am indebted to J. MacDonald Cameron, the deputy master of the royal mint, for the following information:

Quantities of Gold, the Produce of New South Wales, Received into the Royal Mint, Sydney, during 1892 and 1893.

District.	1892.	1893.
	Ounces.	*Ounces.*
Bathurst	16, 289. 59	18, 191. 64
Tambaroora and Turon	2, 514. 61	6, 814. 17
Mudgee	3, 871. 04	2, 746. 42
Lachlan	8, 502. 56	8, 360. 67
Albert	775. 35	975. 41
Southern	5, 859. 63	5, 438. 76
Tumut and Adelong	5, 666. 67	10, 225. 94
Peel and Uralla	32, 032. 63	32, 496. 83
Hunter and Macleay	204. 95	58. 37
Clarence and Richmond	918. 48	716. 68
New England	575. 75	657. 55
Mixed—western, northern, and southern	31, 513. 88	35, 511. 58
Localities unknown	35, 534. 34	48, 903. 05
Total	144, 259. 48	171, 097. 07

From the foregoing table it will be seen that the quantity of gold sent to the mint in 1893 exceeds that sent in 1892 by 26,838 ounces. The principal increase was from the western district, which produced 4,142 ounces over 1892, and the northern district, which produced 1,102 ounces over the previous year. The largest increases came from the Sofala, Carcoar, Braidwood, Adelong, and Tumbarumba divisions. The Mudgee, Lachlan, Southern, Hunter and Macleay, and Clarence and Richmond show decreases.

The following table is compiled from information kindly furnished by the collector of customs:

Export of Gold, 1893.

Gold.		Quartz tailings and pyrites.		Total.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Ounces.		*Packages.*		*Ounces.*	
6, 817	£25, 885	3, 826	£15, 742	11, 015	£41, 627

The quantity of gold sent to the royal mint, plus the quantity exported in 1893, equals 182,112 ounces, but of the 11,050 ounces exported we are informed that 2,824 ounces passed through the mint and is included in the return furnished by the master. The output of gold for 1893 may therefore be set down as 179,288 ounces, an increase of 22,418 ounces as compared with 1892. Last year the Broken Hill Proprietary Company won from their silver mine 3,279 ounces of gold, valued at £13,000, but saved no gold in 1892.

RETURNS OF GOLD FOR 1893 FROM MINT AND MINING REGISTRARS.

District.	Mint.	Mining registrars.	Excess.	Deficiency.
	Ounces.	*Ounces.*	*Ounces.*	*Ounces.*
Bathurst	18,191.64	28,313.20		10,121.56
Tambaroora and Turon	6,814.17	11,946.51		5,132.34
Mudgee	2,746.42	23,941.00		21,194.58
Lachlan	8,360.67	11,853.40		3,492.73
Albert	975.41	5,512.55		4,537.14
Southern	5,438.76	15,449.36		10,010.60
Tumut and Adelong	10,225.94	12,025.80		1,799.86
Peal and Uralla	32,496.83	46,322.28		13,825.45
Hunter and Macleay	58.37	1,906.85		1,848.48
Clarence and Richmond	716.68	4,982.29		4,265.61
New England	657.55	4,711.00		4,053.45
Cobar		6,376.86		6,376.86
Mixed, north, south, and west	35,511.58		35,511.58	
Localities unknown	48,903.05		48,903.05	
Total	171,097.07	173,341.10	84,414.63	86,658.66

The returns furnished by the mining registrars of the gold won in their respective divisions exceeds the quantity passed through the mint by 2,244.03 ounces, but is less than the total output, viz, the quantity passed through the mint plus the export, by 5,947 ounces.

COMPARATIVE STATEMENT OF MINING REGISTRARS' RETURNS OF GOLD FOR 1892 AND 1893.

District.	1892.	1893.	Increase.	Decrease.
	Ounces.	*Ounces.*	*Ounces.*	*Ounces.*
Bathurst	23,704	28,313	4,609	
Tambaroora	11,260	11,947	687	
Mudgee	17,078	23,941	6,863	
Lachlan	12,474	11,853		621
Albert	920	5,513	4,593	
Southern	16,755	15,449		1,306
Tumut and Adelong	7,837	12,026	4,189	
Peel and Uralla	48,807	46,322		2,485
Hunter and Macleay	1,685	1,907	222	
Clarence and Richmond	5,198	4,982		216
New England	4,032	4,711	679	
Cobar	2,362	6,377	4,015	
Total	152,112	173,341	25,857	4,628

The mining registrars' returns of gold for 1893 show an increased yield of 21,229 ounces. The total increase for the year, as shown by the mint and customs return, is 22,418 ounces, a difference of only 1,189 ounces. This is very satisfactory, and shows that the mining registrars have taken greater care than usual in collecting correct information. In some cases these officers experience great difficulty in procuring correct returns.

COMPARATIVE STATEMENT OF AVERAGE YIELDS FROM ALLUVIAL MINES FOR 1892 AND 1893.

District.	Quantity.	Average per ton.		Yield of gold.		
1892.	*Loads.*	*Dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*
Lachlan	5,004	3	2	969	2	12
Southern	60,000	0	1	170	0	0
Hunter and Macleay	50	12	0	30	0	0
Tumut and Adelong	5,541	0	1	133	17	1
Peel and Uralla	126,517	0	2	504	15	0
Total	197,112	0	4	1,807	14	13
1893.						
Bathurst	10,000	0	6	119	0	0
Cobar	983	13	13	665	0	0
Lachlan	1,624	16	3	1,311	0	0
Tumut and Adelong	9,800	0	6	124	0	0
Southern	15,000	0	2	68	10	0
Total	37,407	1	5	2,287	10	0

The foregoing table shows the results obtained from working alluvial ground in the several districts named. It is a difficult matter to obtain correct information on this subject, the miners very seldom keeping a record of the quantity of wash dirt put through, and in many cases are reluctant to disclose the result of their work. The table would be a valuable one were it complete, but it is given as full as possible under the circumstances.

COMPARATIVE STATEMENT OF AVERAGE YIELDS FROM QUARTZ MINES FOR 1892 AND 1893.

District.	Quantity.	Average per ton.			Yield of gold.		
1892.	*Tons.*	*Oz.*	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*
Bathurst	9,980	1	17	8	18,637	11	0
Tambaroora and Turon	6,466	0	17	0	5,499	1	19
Lachlan	10,292	0	14	14	7,513	6	2
Southern	4,829	1	7	18	6,699	3	17
Tumut and Adelong	2,409	1	0	7	2,445	16	12
Peel and Uralla	39,778	0	19	17	39,247	1	11
Hunter and Macleay	240	1	13	7	399	16	0
Clarence and Richmond	1,420	1	18	12	2,024	6	3
New England	2,078	1	4	9	2,532	10	0
Mudgee	17,804	0	13	2	11,648	16	0
Cobar	3,927	0	8	18	1,722	4	4
Total	99,223	0	19	19	98,369	12	20
1893.							
Bathurst	14,248	0	15	2	10,739	0	0
Tambaroora and Turon	2,702	1	2	3	2,991	10	0
Lachlan	2,453	0	13	11	1,648	10	0
Southern	20,405	0	6	16	6,801	10	0
Tumut and Adelong	2,906	1	4	19	3,600	10	0
Peel and Uralla	31,852	1	1	19	34,671	0	0
Hunter and Macleay	361	1	14	14	624	0	0
Clarence and Richmond	1,608	1	0	16	1,660	10	0
Mudgee	21,476	0	12	10	13,357	0	0
Cobar	7,875	1	2	20	8,992	0	0
Total	105,886	0	16	11	85,085	10	0

The foregoing table shows the average yield of sundry parcels of ore treated in the various mining districts. There is much less difficulty in procuring this information relating to quartz than alluvial mining. This table is more complete than usual, and shows the result of crushing 105,886 tons of ore, as compared with 99,223 tons in 1892. The average yield per ton is, however, less by 3 pennyweights 8 grains than in 1892, but the average yield of 16 pennyweights 11 grains from such a large quantity of ore as 105,886 tons is considered fairly satisfactory.

The number of miners employed in gold mining during 1893 was 5,684 Europeans and 717 Chinese in alluvial, and 5,556 Europeans in quartz mining, a total of 11,957, an increase of 2,038 on the previous year.

Dividing the quantity of gold won by the number of miners, the result obtained is that each miner appears to have won 14.99 ounces, or equal to £54 9s. 4d., during the year, as compared with 17.33 ounces, or £62 18s. per man, during 1892.

DETAILS OF THE PRODUCTION OF SILVER AND LEAD.

There has been a very satisfactory increase in the quantity and value of silver and lead produced in the colony during the year, the amount of increase being £553,884. The total value of the output during the year was £3,031,720, which was only exceeded in 1891 since the opening of the silver mines. Our great silver mines at Broken Hill, on the Barrier ranges, contributed nearly the whole of the output, and approximately the quantity of silver in ounces produced from these mines during 1893 was little short of 16,000,000. This will probably be increased should the companies be successful in devising a mode of treating their low-grade sulphide ores at a profit.

QUANTITY AND VALUE OF SILVER AND SILVER-LEAD AND ORE EXPORTED.

Year.	Silver.		Silver-lead and ore.							
			Quantity.						Value.	Total value.
	Quantity.	Value.	Ore.				Metal.			
	Ounces.		*Tons.*	*cwt.*	*qrs.*	*lbs.*	*Tons.*	*cwt.*		
Up to 1881...	726, 779. 14	£178, 405	191	13	0	0	....		£5, 025	£183, 430
1882..........	38, 618. 00	9, 024	11	19	0	0	....		360	9, 384
1883..........	77, 065. 18	16, 488	136	4	0	0	....		2, 075	18, 563
1884..........	93, 660. 25	19, 780	9, 167	11	1	7	....		241, 940	261, 720
1885..........	794, 173. 80	159, 187	2, 095	16	0	0	190	8	107, 626	266, 813
1886..........	1, 015, 433. 10	197, 544	4, 802	2	0	0	....		294, 485	492, 029
1887..........	177, 307. 75	32, 458	12, 529	3	2	0	....		541, 952	574, 410
1888..........	375, 063. 70	66, 668	11, 739	7	0	0	18, 102	5	1, 075, 737	[1] 1, 142, 405
1889..........	416, 895. 35	72, 001	46, 965	9	0	0	34, 579	17	1, 899, 197	1, 971, 198
1890..........	496, 552. 80	95, 410	89, 719	15	0	0	41, 319	18	2, 667, 144	2, 762, 554
1891..........	729, 590. 05	134, 850	92, 383	11	0	0	55, 396	3	3, 484, 739	3, 619, 589
1892..........	350, 661. 50	56, 884	87, 504	15	0	0	45, 850	4	2, 420, 952	2, 477, 836
1893..........	531, 972. 00	78, 131	155, 859	1	0	0	58, 401	3	2, 953, 589	3, 031, 720
	5, 823, 772. 62	1, 116, 830	513, 106	6	3	7	253, 839	18	15, 694, 821	16, 811, 651

[1] In the annual report for 1888, 11,739 tons 7 hundredweight of silver ore, valued at £164,620, was omitted from the table. The bulk of the silver is exported in the form of silver-lead.

The following information relating to the silver-mining industry is taken from reports sent in by the wardens and mining registrars:

ALBERT MINING DISTRICT.

At Broken Hill operations are now almost entirely confined to the Broken Hill lode, the principal mines at work thereon being the Broken Hill Proprietary Company, the Block 14 Company, the Block 10 Company, the British Block Company, the Junction Company, the North Company, the Central Company, and the Broken Hill South Company.

Some of the mines are still experimenting with the object of discovering the best mode of treating the immense bodies of sulphide ores existing in their mines, and there is every probability of the experiments proving successful.

The great depreciation during the year in the value of silver has led to the closing of some of the smaller mines and the restriction of the output in others. Work has gone on smoothly during the year, and the absence of labor troubles has been the means of greatly increasing the quantity of ore raised as compared with 1892, during which year the mines were closed for about four months.

The quantity and value of the minerals exported from this field during the year were: Silver ore, 155,099 tons, valued at £924,290; silver bullion, 38,058 tons, valued at £2,003,562, and 345,770 ounces of pure silver, valued at £51,457.

Great difficulty is experienced in arriving at the exact quantity of pure silver won on this field, as it is nearly all exported in the form of silver-lead, but approximately the quantity was 15,677,345 ounces, as compared with 12,969,195 ounces in 1892.

The New Broken Hill Extended Company, which is contiguous to the main lode, is in receipt of aid from the prospecting vote to crosscut the course of the main lode at the 1,330-foot level. The mines at Nuntherungie are now almost abandoned. The water supply, which used to be a source of trouble to the companies, causing vexatious stoppages in their smelting operations, has now been happily overcome, a plentiful supply being available from Stephens Creek and the Acacia Dam. The number of miners employed on the Barrier Range is given at 4,300, a few hundred less than during 1892, and the population of the Broken Hill district is 22,000.

BATHURST MINING DISTRICT.

In the Mitchell division the Sunny Corner Company's mine has been let on tribute to Mr. Charlestone for a period of three years. He appears to be running it with some success, having smelted 5,102 tons for 37 tons of matte, valued at £2,200, and that during seven months' work. The Phœnix and the Silver King mines are both idle.

In the Rockley division there is still a little silver being got at Back Creek, the quantity during the year being about 4,680 ounces, worth £600. The mine has, however, changed hands, and furnaces for the better treatment of the silver ore are being brought from Sunny Corner.

At Tuena the Mount Costigan lead and silver mine was worked for a short time in the beginning of the year, the output being about £5,000 worth of matte. There is a probability of the mine being restarted at an early date. The Cordillera mine, which has been shut down for some considerable time, has been taken up by Mr. Samuel Fuge, who has four men employed in cleaning up the old workings and effecting repairs. At Lewis Pond all the silver mines are idle.

MUDGEE MINING DISTRICT.

At Denison Town the Mount Stewart Company has, unfortunately, been compelled to stop operations owing to the low price of silver. In the meantime suspension of the labor conditions has been granted the company.

SOUTHERN MINING DISTRICT.

At Captains Flat the Lake George Copper Mining and Smelting Company employ 130 men, and smelted during the year 7,710 tons of ore, from which was extracted over 60,000 ounces of silver found associated with gold and copper in considerable quantities. The new Kohinoor Company are busily engaged continuing their main shaft with assistance from the prospecting vote. The company smelted during the year 4,264 tons of ore, which returned 58,092 ounces of silver, 784 ounces of gold, 137 tons of copper, and 2½ tons of lead, valued in all at about £15,739. This company employs about seventy men, and as the treatment of the silver ore has not been paying, they have during the last two months of the year been working for gold.

NEW ENGLAND MINING DISTRICT.

In the Fairfield division the White Rock Silver Mining Company are about to make another start after being idle about a year, but it is feared that if the present low price of silver continues it will prevent the mine being worked at a profit. The company have erected new works on the cyanide principle, which is said to be very suitable for the class of ore to be treated. At Rivertree the silver-mining companies have practically shut down in the meantime, or until they have decided on the best system of treating the ore which abounds in the locality. The returns from several parcels of ore sent to the Aldershot Works, in Queensland, were very satisfactory. The companies jointly erected a very extensive leaching plant, costing over £3,000, but it did not work up to expectation and is now idle.

PEEL AND URALLA MINING DISTRICT.

There is still a little silver mining going on in the Emmaville division of this district. The amount of ore concentrates of this mineral forwarded from the Deepwater Station for treatment elsewhere was 285 tons, valued at £5,848 14s. Of that amount Webb's mine contriubted 194 tons; the balance came from the Webb's Consols mine, near Strathbogie. It is considered that a slight rise in the price of silver would make these mines paying concerns. The concentrates from the Webb's mine yielded 155 ounces of silver to the ton.

HISTORY OF GOLD AND SILVER IN THE COLONY OF NEW SOUTH WALES TO THE END OF 1892.

[From the Wealth and Progress of New South Wales, 1893, by T. A. Coghlan, Government statistician. Sydney, 1893.]

Gold.—Among the metallic minerals found in the colony gold occupies a foremost place, both on account of the quantity which has been and is now being raised and of the influence which its discovery has had on the settlement of the country. The date of the discovery of gold in New South Wales was for a long time the theme of much controversy and the question as to the original discoverer long disputed. It is now agreed, however, that the existence of gold was known to the authorities during the early days when the colony was a convict settlement, but for obvious state reasons the matter remained secret.

The first authentic record of the discovery of gold is contained in an extract from Assistant Surveyor James McBrian's field book, bearing date February 16, 1823, in which the following note appears:

"At 8 chains 50 links to river and marked gum tree, at this place I found numerous particles of gold in the sand and in the hills convenient to the river."

The river referred to is the Fish River, at about 15 miles from Bathurst, not far from the spot to which the first gold rush was made twenty-eight years afterwards.

In 1839 Count Strzlecki found gold in the Vale of Clwydd and communicated the discovery to Governor Gipps, but he was requested to keep the matter secret lest the knowledge of the existence of gold should imperil the safety and discipline of the settlement. The Rev. W. B. Clarke also found gold in 1841 in the Macquarie Valley and the Vale of Clwydd and expressed his belief that the precious metal would be found abundantly dispersed throughout the territory.

But it was not until the year 1851 that payable deposits were proved to exist in New South Wales, and this important discovery was due to Mr. E. Hammond Hargraves, who on his return some time previously from California pointed out to the Government the localities in which he had found payable deposits of alluvial gold, viz, at Lewis Ponds and Summer Hill Creek, in the districts of Bathurst and Wellington. Prospecting operations followed in the neighborhood, with the result of which everyone is now familiar. A few weeks later rich deposits were discovered at Ballarat, Mount Alexander, and other gold fields in Victoria, and the world witnessed a gold rush from all parts of the earth to these colonies similar to that which some years before had taken place to California. The probable effects of the movement were not clearly seen at the time, either here or in the United Kingdom, but the result has been the creation of states whose future is surrounded with the brightest promise.

Native gold is the only true mineral species of gold which has so far been found in New South Wales, and was first met with in easily worked alluvial deposits. Alluvial diggings have always attracted the greater number of miners, as the precious metal is dug out without costly appliances. But, however rich they may be, these deposits are very soon worked out, for their area is generally of limited extent. In the alluvial deposits gold is found associated with a variety of minerals; it occurs in the shape of grains and nuggets, waterworn in appearance, and some of considerable size. Though New South Wales has not yielded nuggets of so extraordinary a size as those found in the neighboring colony of Victoria, some very splendid specimens of that gold formation have nevertheless been unearthed at various times. Thus in July, 1851, a mass of gold was found on the Turon River gold fields which weighed 106 pounds, or 1,272 ounces. In November, 1858, at Burrandong, near Orange, another nugget was found which when melted at the Sydney mint gave 1,182 ounces 6 pennyweights of pure gold, of the value of £4,389 8s. 10d. A third nugget, called the Brennan, was sold in Sydney in 1851 for £1,156. In 1880 and 1882 several nuggets which were unearthed at Temora weighed from 59 to 139 ounces, and in 1887 nuggets were found by fossickers in various parts of the country, four of which, weighing respectively 357 ounces, 200 ounces, 47 ounces, and 32 ounces, were obtained at Hargraves; and another, weighing 30 ounces, was also discovered in that year at Maitland Bar, in the Mudgee district, and was worth about £1,236.

Although the alluvial deposits discovered in the early days have been practically abandoned, and are considered as worked out, there is ample evidence that the surface of the country has been merely scratched. The search for gold has been vigorously prosecuted for more than forty years; but new gold fields and fresh deposits are nevertheless being continually discovered in localities supposed to have been thoroughly examined. The gold formation is very widely diffused throughout the colony, as may be gathered from the fact that the gold fields of Albert, Delegate, and Ballina are between 600 and 700 miles distant from each other; and it has been estimated that the extent of country covered by formations in association with which gold always occurs exceeds 70,000 square miles, while the precious metal has also been found in formations where its presence was never suspected. A considerable portion of this area, equal to nearly one-fourth of the whole surface of the colony, has never been touched by the pick of the miner.

It is well known to the mining public that many mines which gave promise of handsome results were abandoned in the early days simply because the appliances at hand were not sufficiently powerful or well directed to save the gold contained in the foreign matter with which it was found associated. At Wattle Flat, on the Turon River, and at many places on the older gold fields, gold was found in deposits of iron pyrites, which have since proved to be in a very high degree payable; but these claims, when apparently exhausted, were abandoned some years ago, the miners lacking the necessary knowledge or skill to obtain from the pyrites the whole of the gold they contained. Improved methods of extraction have since been invented and a rich harvest awaits the skilled miner who shall bring to bear upon the development of this industry modern knowledge and appliances such as are being successfully employed in other countries.

Gold is also found in quartz veins, occurring in older and metamorphic rocks, such as argillaceous slates, chloritic and talcose schists, as well as granite, diorite, serpentine, and porphyry. Vein gold is associated more commonly with iron pyrites, though found with copper, lead, zinc, and silver ores, and occurring also in asbestus. But the extraction of gold from quartz veins requires the erection of extensive machinery and gold-saving appliances, involving an outlay of capital such as the ordinary miner seldom possesses. Quartz mining is generally carried on by companies.

Gold has been found in the coal measures and Carboniferous strata. The Rev. W. B. Clarke detected it in the Hawkesbury sandstone formation on the north side of Sydney Harbor, and he also mentions that it is distributed through the sand at the mouth of the Richmond River. Along the southern part of the coast of New South Wales gold has been found near the shore in the sand washed by the waves of the Pacific Ocean, while at Bermagui and in the district extending between Moruya and Eden important discoveries of the precious metal have also been made. It would be impossible to name every part of the colony in which gold is found, as it appears throughout the greater part of the territory, and there is ample evidence that deposits exist which will offer to the prospector or the miner a profitable field of employment for many years to come.

The following table shows the quantity and value of the gold received for coinage at the mint, and exported during each year since 1851:

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Ounces.			*Ounces.*	
1851	144,120	£468,336	1873	361,784	£1,395,175
1852	818,751	2,660,946	1874	270,823	1,040,329
1853	548,052	1,781,172	1875	230,882	877,694
1854	237,910	773,209	1876	167,411	613,190
1855	171,367	654,594	1877	124,110	471,418
1856	184,600	689,174	1878	119,665	430,033
1857	175,949	674,477	1879	109,649	407,219
1858	286,798	1,104,175	1880	118,600	441,543
1859	329,363	1,259,127	1881	149,627	566,513
1860	384,053	1,465,373	1882	140,469	526,522
1861	465,685	1,806,171	1883	123,805	458,509
1862	640,622	2,467,780	1884	107,198	395,292
1863	466,111	1,796,170	1885	103,736	378,665
1864	340,267	1,304,926	1886	101,416	366,294
1865	320,316	1,231.243	1887	110,288	394,579
1866	290,014	1,116,404	1888	87,503	317,100
1867	271,886	1,053,578	1889	119,759	434,070
1868	255,662	994,665	1890	127,760	460,285
1869	251,491	974,149	1891	153,336	558,306
1870	240,858	931,016	1892	156,870	569,178
1871	323,609	1,250,485	Total	10,557,304	39,202,666
1872	425,129	1,643,582			

This table shows that the production of gold in New South Wales has, since the year 1872, considerably decreased. This decrease is explained by the fact that the rich alluvial deposits discovered in the early days have been exhausted and that other resources of a more permanent nature are being developed. The latter offer steadier employment to the laboring classes without, it is true, the chance of accumulating rapid fortunes, but with more security against loss.

The principal seats of alluvial gold mining are the Bathurst and Mudgee districts and the country watered by the various feeders of the Upper Lachlan, and also in the Tumut and Adelong and Braidwood districts. In 1880 the Temora gold fields. in the Murrumbidgee district, about 30 to 40 miles from the inland town of Wagga Wagga, were discovered, and were for some years in a flourishing condition. The district is now drifting from mining into an important agricultural settlement. In the north of the colony, in the New England district; on the coast in the county of Gloucester, and in the extreme northwest at Mount Poole, Mount Browne, and Tibooburra, the gold fields sustain a considerable population of miners. The system of hydraulic sluicing is adopted in only two or three mines in the New England district; at Kiandra, on the southern table-lands where extensive reservoirs have been formed, and the face of the rocks attacked; in various places at Nelborthery, near Bombala, where the Delegate River Hydraulic Sluicing Company have erected machinery capable of lifting 4,500,000 gallons of water to a height of 330 feet in twenty-four hours; and in the Shoalhaven Valley, where large sums have been expended by companies in endeavoring to bring water to bear for sluicing several promising beds of alluvium.

The principal quartz veins are situated near Bathurst, Armidale, Hill End, and Mudgee; the two last-mentioned gold districts had, up to the end of 1892, already yielded 1,170,669 ounces, or nearly 36 tons of gold, valued at £4,540,524. The geological surveyor who examined this field in 1886 reported that its resources were far from being exhausted. At Adelong, Tumut, Temora, Parkes, Peak Hill, Jindera, and near Gundagai reefs are also profitably worked, as well as in the southeast of the colony.

Much enterprise has been shown during the last few years in the search for gold, and quartz reefs have been opened up in many parts with profitable results. Old workings which had been abandoned years ago under a prevailing idea that they were valuable only on the surface and which had scarcely in any instance been tested to a greater depth than 200 feet, have been reopened with very encouraging results.

An important feature of the gold-mining industry of late years is that the number of persons employed in alluvial mining and the revenue derived from this source have diminished considerably, while quartz mining is more and more becoming a permanent industry, the returns from that source during 1892 being more than double that of the year 1890 and much in advance of any year shown in the subsequent table.

The number of persons engaged in alluvial and quartz mining and the production during the last five years were as follows:

Year.	Number of miners.		Production.	
	Alluvial.	Quartz.	Alluvial.	Quartz.
			Ounces.	*Ounces.*
1888	4,368	3,910	36,796	36,539
1889	5,623	4,569	37,170	75,777
1890	6,304	6,285	58,830	58,832
1891	4,748	6,418	49,625	100,421
1892	4,030	5,019	35,024	121,846

The gold found in New South Wales is never absolutely pure, always containing traces of other metals, such as copper, iron, and bismuth, and often a fair percentage of silver. To the presence of the latter its light-yellow color is due. New South Wales gold is generally lighter in color than Victorian gold but of a deeper yellow than that found in the fields of southern Queensland; its specific gravity averages about 17.5.

The authority to dig for gold costs only 10 shillings a year and entitles its possessor not only to take up ground for mining, but also to occupy in a mining township one-fourth of an acre, or outside a town, 1 acre of land, for a business site.

Of the 1,068 applications made during 1892 to lease Crown lands for mining purposes, 602 were for auriferous land, embracing an area of 3,987 acres. The steam engines employed in quartz mining numbered 225, with an aggregate of 3,496 horsepower. There were also 204 crushing machines and 1,448 stamp heads. In alluvial gold and tin mining there were employed 27 steam engines, of which the aggregate horsepower equaled 301. The value of the machinery employed in gold mining is estimated at £570,143. During the year 1892 the number of persons more or less regularly employed in various parts of the colony in gold mining was 9,049, of whom 8,521 were Europeans and 528 Chinese. There were 5,019 persons engaged in quartz mining and 4,030 in the alluvial diggings.

The quantity of gold, the produce of New South Wales, received at the Sydney mint for coinage during 1892 amounted to 144,259 ounces. of the gross value of £522,866, the average price being nearly £3 12s. 6d. per ounce. The figures for 1892 show an increase of 1,789 ounces when compared with those of the previous year, which in their turn had shown an increase of 22,906 ounces over the figures for 1890, results which are very satisfactory on the whole. It must always be borne in mind that the results of quartz mining are, in few cases, immediately seen. Much patient labor and the expenditure of a large amount of capital must take place before payable gold is obtained, and the leases taken up two years ago are only now beginning to show a return for the time, labor, and money which have been bestowed upon them. The average weight of gold obtained by each miner in 1892 was 17.33 ounces, valued at £62 18s. It must not be supposed, however, that these men were employed during the whole year for so small a wage. Many of the miners follow other pursuits during a portion of the year; besides which there were several new fields from which as yet very little returns have been made, and a large number of men were engaged in prospecting.

The following table shows the average yield of gold obtained from certain parcels of quartz crushed in several of the mining districts during 1892:

District.	Quantity.	Average per ton.			Yield of gold.		
	Tons.	*Oz.*	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*
Bathurst	9, 980	1	17	8	18, 637	11	0
Tambaroora and Turon	6, 466	0	17	0	5, 499	1	19
Lachlan	10, 292	0	14	14	7, 513	6	2
Southern	4, 829	1	7	18	6, 699	3	17
Adelong and Tumut	2, 409	1	0	7	2, 445	16	12
Peel and Uralla	39, 778	0	19	17	39, 247	1	11
Hunter and Macleay	240	1	13	7	399	16	0
Clarence and Richmond	1, 420	1	18	12	2, 024	6	3
Mudgee	17, 804	0	13	2	11, 648	16	0
Cobar	3. 927	0	8	18	1, 722	4	4
New England	2, 078	1	4	9	2, 532	10	0
Total	99, 223	0	19	19	98, 369	12	20

The number of fatal accidents in gold mines during 1892 was 10, 3 more than in each of the two previous years. Six men lost their lives in auriferous quartz mining and 4 in alluvial workings; 11 were injured in quartz mines and 3 in alluvial mines.

From the date of the first discovery of payable gold, in 1851, to the end of the year 1892 the quantity of gold produced in the Australasian colonies represents a total value of £355,031,670, extracted in the short space of forty-one years. The share of each colony in the production of this wealth is given hereunder:

Colony.	Value.	Proportion raised in each colony.
		Per cent.
New South Wales	£39, 202, 666	11. 04
Victoria	232, 405, 716	65. 46
Queensland	30, 206, 652	8. 51
South Australia	1, 294, 014	. 36
Western Australia	947, 001	. 27
Tasmania	2, 587, 803	. 73
New Zealand	48, 387, 818	13. 63
Total	355, 031, 670	100. 00

By far the largest portion of this amount was produced by the colony of Victoria, amounting to two-thirds of the whole. New Zealand is the next largest producer, New South Wales coming third.

Silver.—Up to the year 1882 the quantity of silver raised in New South Wales was very small, but in that and the following years extensive discoveries of this metal, associated principally with lead and copper ore, were made in various parts of the colony, notably at Boorook, in the New England district, and later on at Sunny Corner, near Bathurst, and at Silverton, Broken Hill, and other places on the Barrier Range.

The argentiferous lead ores of the Barrier Range and Broken Hill districts of New South Wales have, more than any other, attracted attention. This rich silver field, which was discovered in 1883 by Charles Rasp, a boundary rider on Mount Gipps Run, extends over 2,500 square miles of country, and has developed into one of the principal mining centers of the world. It is situated beyond the Darling River and on the confines of the neighboring colony of South Australia. In the Barrier Range district the lodes occur in Silurian metamorphic micaceous schists, intruded by granite, porphyry, and diorite, and traversed by numerous quartz reefs, some of which are gold bearing. The Broken Hill lode is the largest as yet discovered. It varies in width from 10 feet to 200 feet, and may be traced for several miles, the country having been taken up all along the line of the lode and subdivided into numerous leases held by mining companies and syndicates.

The Broken Hill Proprietary Company hold the premier position. They have erected on their lease a complete smelting plant on the latest and most approved principles, and have enlisted the services of competent managers, whose experience has been gained in the celebrated silver-mining centers of the United States. From the commencement of mining operations in 1885 to the beginning of June, 1893, the company treated 1,288,785 tons of silver and silver-lead ores, producing 44,794,847 ounces of silver and 183,334 tons of lead, valued in the London market at £9,775,438. They have paid dividends to the amount of £4,360,000 and bonuses amounting to £592,000, besides the nominal value of shares from the several "blocks," amounting to about £1,744,000, or a total return from the mine of £6,696,000. The sum spent in the erection and construction of the plant from the opening of the property was £471,322. During the year 2,938 men were employed, of whom 1,099 were engaged underground, 402 on the surface, 457 quarrying, etc., 555 smelting, and 425 in miscellaneous occupations. The mine wages and salary sheet for the half year ending May, 1893, was £133,881, and the smelters', refiners', and ore dressers' wages and salaries amounted to £89,086. The net profit for the half year was £456,813.

Besides the mines at Broken Hill there are valuable workings at Silverton and Thackaringa, in the same district. The quantity of silver and ore raised during

1892 from the Barrier country was 403,132 tons, representing a value of £2,479,692. As a natural consequence of the success of these mines, numbers of miners were attracted to the district, and the population, which in 1883 consisted of only a few station hands, had risen to 24,463 souls at the date of the 1891 census, of whom 6,465 men were employed in and about the mines. The aggregate output of these mines, including the Proprietary, to the end of 1892 was valued at £12,559,549. The value of the machinery in the Broken Hill mines was £445,848, and in the Silverton mines, £89,316, making a total of £535,164 for the Barrier district. The proxmity of Silverton and the Barrier district to the colony of South Australia could not fail to attract the attention of the business people of Adelaide, who were not slow to realize the advantages which they would obtain by attracting toward their capital the traffic of a region of such immense wealth. The railway system of South Australia was immediately extended to the border, and in the colony of New South Wales a tramway was laid down, thus connecting the town of Silverton and the mines of Broken Hill with the railway to Adelaide and Port Pirie, in the latter instance reducing the land carriage by some 70 to 80 miles.

In June, 1892, the directors of the various mines in the Broken Hill district decided after a certain date to carry out all future operations by contract instead of by day labor, the system heretofore prevailing. The miners resented this action by going out on strike, and the mines were laid idle for a period of upward of three months. It is mainly owing to this fact that the production of 1892 was far below that of the previous year.

The Sunny Corner silver mine during 1886 paid handsome dividends, and produced £160,000 worth of silver, but since that period the yield has largely fallen off. During the year 1891 the company raised from their mine 35,287 tons of ore and smelted 39,046 tons, the production from which was valued at £104,565. The number of men employed in and about the mines was 350, and the value of the smelting plant, etc., £16,024. During 1892 operations at this mine were suspended.

The quantity and value of silver and silver-lead and ore exported to the end of 1892 from New South Wales is shown in the following table:

Year.	Silver.		Silver-lead and ore.					Total value.
	Quantity.	Value.	Quantity.				Value.	
			Ore.		Metal.			
	Ounces.		*Tons.*	*cwt.*	*Tons.*	*cwt.*		
Up to 1881	726, 779	£178, 405	191	13			£5, 025	£183, 430
1882	38, 618	9, 024	11	19			360	9, 384
1883	77, 066	16, 488	105	17			1, 625	18, 113
1884	93, 660	19, 780	4, 668	1			123, 174	142, 954
1885	794, 174	159, 187	2, 095	16	190	8	107, 626	266, 813
1886	1, 015, 434	197, 544	4, 802	2			294, 485	492, 029
1887	177, 308	32, 458	12, 530	3			541, 952	574, 410
1888	375, 064	66, 668	11, 739	7	18, 102	5	1, 075, 737	1, 142, 405
1889	416, 895	72, 001	46, 965	9	34, 579	17	1, 899, 197	1, 971, 198
1890	596, 552	95, 410	89, 715	15	41, 319	18	2, 667, 144	2, 762, 554
1891	729, 590	134, 850	92, 383	11	55, 396	3	3, 484, 739	3, 619, 589
1892	350, 661	56, 884	87, 504	15	45, 850	4	2, 420, 952	2, 477, 836
Total	5, 391, 801	1, 038, 699	352, 714	8	195, 438	15	12, 622, 016	13, 660, 715

It will be seen that the production of silver has, during the past few years, considerably increased, until in 1891 it largely exceeded the annual production of gold even in the palmiest days of the diggings; and although the production of 1892 was so adversely affected by the strike at Broken Hill, it was still in excess of the production of gold during any year, with the exception of 1852. The number of miners engaged in silver and silver-lead mines in 1892 was 5,889, and the average value of mineral won, per miner engaged, amounted to £420 15s. 2d.

The total number of accidents which took place in the silver mines of New South Wales during the course of the year 1891 was seventeen, six persons losing their lives. Such a small proportion of casualties, when compared to the number of persons engaged in silver mining, where the elements of danger are great, must be taken as reflecting considerable credit on the management of the mines.

WEST AUSTRALIA.

[London Economist, February 23, 1895.]

WESTERN AUSTRALIAN EXPLOITATION.

That many of the West Australia mines will produce satisfactory results is highly probable, for the existence of extensive gold fields has now been proved in several districts; and though the water supply may prove a source of recurring difficulty, it is reasonable to assume that during a large proportion of the year mining operations will be practicable on a large scale. So far, indeed, the progress made in the extraction of gold has been quite satisfactory, as the following statements, which are extracted from the Australian Mail, show:

"The quantity and value (at £3 16s. per ounce) obtained from the respective gold fields during 1894 are given as follows:

Where produced.	Quantity.			Value.		
	Oz.	*dwt.*	*gr.*	£	*s.*	*d.*
Kimberly	588	12	17	2,236	16	4
Pilbarra	16,254	10	0	61,767	2	0
Yilgarn	136,828	4	[1]4	519,947	3	9
Ashburton	285	5	10	1,084	6	8
Murchison	52,946	6	11	201,196	0	7
Dundas	228	7	12	867	16	6
Total	307,131	6	6	787,099	5	10

[1] Including from Coolgardie 105,329 ounces 16 pennyweights 11 grains.

"The total value of the gold exported from the colony from January 1, 1886, to December 31, 1894, is given as £1,728,423 19s. 4d.

"The Yilgarn total given here is misleading, for the Coolgardie district must have produced nearly 20,000 to 25,000 ounces more than the 105,330 ounces credited to it. All of the figures refer to exports only, the actual production of which no record at all has been kept, being much larger. The quantity of gold produced and entered for shipment at the customs in 1886 was only 302 ounces. In 1887 it was 4,873 ounces and in 1888 3,493 ounces. The rate of progress since then is shown in the table appended. It will be noticed that for 1889 only Pilbarra and the total are given, the reason being that no separate account was kept till 1890 of the fields producing gold."

Where produced.	1889.	1890.	1891.	1892.	1893.	1894.	Total.
	Ounces.	*Ounces.*	*Ounces.*	*Ounces.*	*Ounces.*	*Ounces.*	*Ounces.*
Coolgardie and Yilgarn		5,000	12,833	21,209	69,631	136,828	245,501
Murchison			2,064	24,356	27,188	52,946	106,554
Pilbarra	11,220	16,054	10,964	12,894	11,698	16,255	79,085
Kimberly		1,752	2,700	1,089	1,622	589	7,752
Dundas					284	228	512
Ashburton			1,750		467	285	2,502
Other districts	4,272						4,272
Total	15,492	22,806	30,311	59,548	110,890	207,131	446,178

It is interesting, too, to observe that the production of the precious metal last year showed a steady rate of progression quarter by quarter. In the first quarter it amounted to 35,368 ounces, in the second to 40,450 ounces, in the third to 62,846 ounces, and in the fourth to 67,567 ounces. As a large amount of exploratory work has been done during the past six months, it is to be hoped that the output during the current and succeeding years will show a further and continuous expansion.

THE GOLD FIELDS OF WEST AUSTRALIA.

[From an interview with Mr. C. A. Moreing in the London Mining World, October 20, 1894.]

There is no firm that has reported so extensively upon the gold fields of West Australia as that of Messrs. Bewick, Moreing & Co., the well-known and highly esteemed mining engineers. Many of the companies that have lately been before the public have proceeded to allotments largely upon the strength of the reports this firm has made. They have at the present time five representatives in West Australia, who are kept busily employed in verifying, or, as is often the case, condemning vendors' reports, and from the very first they have been associated with the new gold field. But it is one thing to speak favorably of a few individual properties and quite another to have a well-grounded opinion of the permanency of the gold fields of West Australia as a whole. It was, therefore, with the object of inducing Mr. C. Algernon Moreing to give his views generally upon the gold fields of West Australia that our representative this week waited upon him, and these he expressed, as will be seen by what follows, with no halting or uncertain voice. What he said to our representative we feel sure will be read with the greatest pleasure and interest.

"The public, Mr. Moreing, attach much importance to your views with regard to West Australia, but will you give me your opinion of the gold fields of West Australia from the general rather than from the particular point of view; and, to commence, will you tell me what first directed your attention to West Australia?"

"During the latter part of 1893 and the beginning of the present year, I became firmly convinced from much evidence that came to me that the gold discoveries in West Australia were of a sensational character. You will remember that in January of this year the Hon. H. J. Saunders came to England for the purpose of interesting the British public in the mines of West Australia?"

"I remember it well, because then, January last, we published a special four-page supplement with a sketch map of Western Australia, indicating the gold fields, and recommending them to the very careful consideration of investors."

"Well, Mr. Saunders came to England and sought the assistance of Mr. Allen H. P. Stoneham, of the firm of Monkhouse, Goddard & Co., in forming the West Australian Gold Fields, Limited. I arranged with them to send one of my most trusted assistants, in the person of Mr. William A. Mercer, to West Australia to confirm, or otherwise, the very glowing statements that Mr. Saunders had made. Now, I say at once, that Mr. Mercer confirmed all that that gentleman had said, and we are now persuaded that in West Australia we have probably the richest gold fields ever discovered. Mr. Mercer's early reports were rapidly followed by the sensational discoveries that have now made West Australia the most famous gold field in the world, and caused all previous discoveries to pale into comparative insignificance. The great California discoveries of 1849 will not compare, either in extent or richness, with those of the new El Dorado. In California the gold was principally alluvial, although there were many quartz veins. Still these quartz veins were of quite ordinary value, whereas in West Australia the gold is in veins of quartz of almost fabulous richness and undoubted permanency. They compare as regards regularity and permanence with the celebrated reefs of Johannesburg, but where the latter contain gold in pennyweights the reefs of Western Australia contain it in ounces."

"I understand that the deepest shaft at Bayley's reef is 250 feet?"

"Yes, probably it is a little deeper at this time, and the reef holds down. The result of these wonderful discoveries has been to send some people here a little off their balance. Those who at first doubted and scoffed are now rushing in and buying shares in any of the concerns that are offered, some of which are quite valueless and of the purely wild-cat order. So-called experts have been tracing Bayley's, the Londonderry, the White Feather, Hannan's, Brownhill, and other well-known reefs to all points of the compass for miles, north and south, east and west, and mining companies have been floated in a rush with large paper capitals to take advantage of the excitement. Some of these companies, I do not hesitate to say, are never intended to work mines; they are only floated for the purpose of selling shares to the public."

"Will you tell the public how to discriminate between the good and the bad; how to separate the joint stock sheep from the joint stock goats? If you can answer this question you will do a great service to the public."

"To discriminate between the good and bad companies requires but the application of very simple rules, four in number. First, avoid any company that only has vendors' reports to recommend the property to be acquired. Unless the directors of a company have been sufficiently careful to obtain an independent report and are sufficiently honest when it is obtained to act upon it avoid that company as you would the plague. That is the first rule, and the second is like unto it: Avoid companies which are floated largely on the strength of a famous mine adjoining. They are generally swindles. You will see some of these West Australian prospectuses with no allusion to the property which the company is to acquire, but every allusion to some valuable property adjoining, which belongs to somebody else. While giving in all the glories of large type and glowing language a description of these adjoining properties they are careful to avoid saying anything about the property which is being offered. Third, you must see that respectable directors and engineers are in charge, men who would not permit a company to be floated without a well-examined—independently examined—property and a sufficiency of working capital. Fourth, ascertain that the company is brought out under respectable auspices. There are several companies now engaged in West Australian business that have able and trustworthy representatives on all the various gold fields. The public may be sure that anything bearing their stamp is genuine. The chief of these are the West Australian Gold Fields, Limited, and the London and Western Australian Exploration Company."

"You are largely represented on the spot?"

"My firm have now five representatives in West Australia, and we are able to obtain reports by cable upon almost any property within a reasonable time, and some other well-known firms of London mining engineers have also their representavives out there, so their is no excuse for directors floating properties without having a report to check that of the vendors, and this can be obtained in a reasonable time—at the outside within a month. Where this can not be obtained you may rely upon it that in nine cases out of ten the object is to take advantage of the boom. No one wants to bring out a company in such a tremendous hurry that he can not wait a month for reliable information. It is not a matter of correspondence, but of cabling, and where time for verification is not allowed you may generally conclude that so long as they get something out of the boom the people connected with such enterprises do not care whether the mines are good or bad."

"Having thus asked you to discriminate between the good and bad companies, will you tell me which is the best field, the Coolgardie, the Murchison, the Pilbarra, the Kimberly, or the Ashburton?"

"There is nothing to choose between them. The whole of West Australia is one great gold field. There may be geographical distinctions in the names, but the geological distinctions are trifling. Of course, in a vast extent of country like that there are some places where water is much more scarce than others and where the facilities for working are not so good, but I believe in the Murchison district both fresh and salt water is more plentiful at present than at Coolgardie, Dundas, or Kurnalpi.

But in the Murchison there is less fuel, which is a very serious drawback, whereas Coolgardie is well supplied with timber. The accessibility of the fields is very much the same. The Government is building a railway to Coolgardie, as well as to Cue, the latter being the center of the Murchison district. There is no reason why Pilbarra and Ashburton and other places should not be as good as Coolgardie and Murchison, but the farther you get north the hotter and more unhealthy becomes the climate. My information is that water is undoubtedly very scarce, but my agents think that there will be plenty of it found in depth, either by sinking wells or by means of artesian bores. They do not feel any anxiety about the water question. Most of the water is very salt indeed, but this can be got over by means of compound condensing engines. The mere question of salt water is not one which can permanently militate against mining. The water difficulty will very soon be solved. I remember well when at Kimberly (South Africa) we had no water there. We used to pay 5 shillings a barrel for it when I first went there, but now there is more water in Kimberly than in London. We used to pay 2s. 6d. for a bottle of soda water to wash in, so scarce was ordinary water, but now the people of Kimberly water their gardens with a hose. We soon found it.in any quantity, and I myself sank some of the early shafts for water. We used to be drowned out when we got to 150 feet. I do not anticipate any permanent difficulty with regard to the water at Coolgardie. Of course in the early days its absence is a serious difficulty, but possibly it prevents things going ahead too fast."

"A great deal of machinery must be going forward just now?"

"Yes; a part of it is made in Adelaide and the rest in England. The people who have had the first show in West Australia are the Sandycroft Foundry Company. They have sent out a large plant for the Golconda Gold Mining Company in the Murchison, and they have a lot of other work in hand."

"Is there motive power to work it?"

"That is an important point. There is considerable difficulty in dealing with salt water in boilers, and in some parts there is an absence of timber and coal for fuel, but we are getting over this difficulty now by means of oil engines. These have lately taken a great stride ahead, and Hornsby, of Grantham, are to the fore with the oil engine they call "Hornsby's akroyd." The oil is not used in the boiler, as some people imagine, but in the cylinder, and no boiler is required. You simply have a tin of oil as you have a receptacle for paraffin, and the oil is burned in the cylinder of the engine. Quite a number of oil engines were introduced, but this one of Hornby's will burn any kind of oil, even olive oil. This saves all trouble with fuel and water, so far as motive power is concerned."

"Have you observed the working capital of the various companies, and do you think it sufficient?"

"It is impossible to lay down any hard and fast rule. The public can not determine what is or what is not sufficient working capital, for the reason that the facts are not before them. The conditions vary in almost every mine. I am inclined to think that the capital of some of them is too small; but in West Australia you do not want a large capital, as in South Africa, because the ore is much richer, and consequently smaller batteries are required. You would not think in West Australia in the early days of putting up 150 or 200 stamps, as at the Rand, where they are crushing ore averaging 8 or 10 pennyweights per ton. On a mine like Bayley's they are getting as many ounces to the ton. The latter mine has only to stamp a small quantity of quartz to get as much gold as a 500-stamp mill of the latter kind would obtain from Rand ore. A 5-stamp mill can be put up, even in West Australia, for £5,000 or £6,000."

"What about transport?"

"The cost is very heavy, but not so heavy as it used to be to Johannesburg and Kimberly—a point that people are apt to forget—and it is not so heavy as it is to Mashonaland and Matableland even now. The rapid progress of railways—and out there it is very rapid—is solving this problem also."

"I am now about to ask you the most important question of all, with which, so far, you have only partially dealt. Tell me, do you think these reefs will maintain their richness in depth? Are not these discoveries phenomenal?"

"Yes; they are. It is quite phenomenal to have such rich veins as we find in West Australia. It is true that we have had rich reefs like that of El Callao, which, you may remember, often ran to 60 ounces to the ton, but we have never before had so many of them spread over so large an area and so very rich; but because we have never had such phenomena before is no argument why we should not have them now."

"I must press the point. Do you judge of the permanence of these reefs by the experience of Bayley's Reward mine, which has been sunk 280 feet; in other words, do you believe the permanency of these reefs proved?"

"I do, most sincerely. Let me give you a little bit of mining history. When the Rand was discovered the most celebrated mining expert of the day condemned the reef and said it would not go down; that it was only a surface deposit; and he kept off from the Rand for a considerable time a number of the biggest houses. I went out to the Rand in 1889, taking with me for clients £100,000 to invest. As soon as I arrived there I found that the whole of the outcrop companies were at an inflated value, and I told my people that there was nothing to be done for them in the way of buying, but I recommended them to purchase deep-level properties. I saw that the reefs were dipping and that in a short time the veins of the outcrop companies would dip out of their end lines. With this idea I bought a large interest for those I represented in the Durban Roodeport Deep Level, my calculation being that a vertical shaft sunk to the dip would cut the reef at 300 feet and cut off the whole of the Durban Roodeport Company's property. Nearly everybody scoffed at the idea of going down what was called the enormous depth of 300 feet. Of course this was pure nonsense, but it was mixed up with the idea that the reefs would not hold down. I had the greatest difficulty in persuading my people to put some of their money into these deep levels. Well, that was in 1889, but what do we find to-day? People are buying up deep levels, even where it is known that the veins can not be touched under 2,000 feet, and those most active in doing so are the very men who scoffed at me in 1889. It is the same way that some people are now talking of West Australia. Although we have gone down 280 feet in one case, they say it is only a superficial deposit. I am afraid they are only "superficial" reasoners. I am perfectly satisfied, so far as I am concerned, of the permanency of these West Australian reefs, and equally satisfied am I that we shall get sufficient water to work these mines. In my opinion, the future of West Australia as the biggest gold field that the world has yet seen is assured."

NEW ZEALAND GOLD FIELDS.

[From the Statist, London, May 18, 1895.]

The Coromandel and Thames Peninsula, situated in Auckland, New Zealand, is traversed by a range of mountains for about 100 miles. A considerable portion of this range is still covered with primeval forest, making prospecting of the auriferous reefs known to exist throughout this region very difficult, and the more so in former years on account of the hostility of the natives. In the northern division of the range the Coromandel and Thames gold fields are situated, while the southern end is known as the Upper Thames gold fields, but it is now believed to be one continuous gold field, extending from the Waihi in the south to the Kapanga in the north.

Until recently the equipment for mining the gold was both incomplete and inefficient The Kapanga property, which is the pioneer mine of the Hauraka gold fields, for a number of years has been sinking through what is locally known as a "horse," i. e., a barren section of country. Rich specimen stone has occasionally been met with, but the finding of this has been a good deal on the system of "looking for a needle in a haystack." The late minister of mines for New Zealand, a thoroughly practical miner, when he inspected this district formed an opinion that the "horse" would be passed through and a good auriferous reef met with in depth. With this object in view he induced the Government to contribute £1,000 toward the cost of sinking the shaft.

This opinion has proved correct, in so far as the "horse" has been passed through and gold found in the shaft, and at 850 feet a slate formation has come in, indicative of the near presence of gold. Between the Kapanga and the Hauraka mines lies the Blagrove's freehold, belonging to the Kapanga Company, and Lynch's paddock.

During the past four months the Hauraki has produced a net profit of over £29,000 upon a paid-up capital of £6,256. This was the old Coromandel property, and the reef in some respects resembles the Caledonian Company's reef on the opposite side of Tokatea, which paid £553,000 in dividends in nine months. What makes the intervening ground so valuable is that the Scotty's and Kapanga reefs on the Kapanga property are underlying directly into Blagrove's freehold and Lynch's paddock, while the rich reef giving such good results on the Hauraki is also dipping through Lynch's paddock and Blagrove's freehold. These reefs will junction in one of these properties. All these three reefs are true fissure veins and are dipping directly toward each other, while another good reef, known as the Green Harp, is striking directly into this common center. The Scotty's-Hauraki Company are now erecting machinery preparatory to sinking a new shaft to develop the Kapanga line of reef. The North Kapanga, adjoining, is driving an adit level to cut the Kapanga and Scotty's line of reefs.

The Tokatea Mountain is near to Scotty's, upon which for the past eight years a number of tributors have worked on the basis of paying 20 per cent royalty to the owners, and have continued to make a good living by bringing down sackfuls of selected ore to the neighboring companies' potteries. They took no ore unless it showed visible gold, in consequence of which large quantities of mullock, which will give an ounce to the ton, have been thrown aside.

The Royal Oak Company, which was recently floated here, is developing a 25-acre section of the Tokatea Mountain, beyond which a number of native companies have worked, of which the Caledonian was the most successful.

The Waihi mine is situated on the Upper Thames section of this gold field. At present there is in sight stone enough on the Waihi to keep ninety stamps at work for seven years at the rate of 40,000 tons per annum.

The following are the results for 1895:

Run commenced.	Run ended.	Time.	Tons.	Bullion.	Price of share end of month.
		Days.			
January	February 9	38	3,050	£11,400	£$6\frac{1}{2}$
February	March 9	28	2,150	7,600	$6\frac{3}{16}$
March	April 6	28	2,150	7,300	$6\frac{2}{16}$
April	May 4	28	2,200	7,500	$7\frac{1}{2}$

The main features in connection with mining in this district are: The abundance of water all along the range of mountains; the cheapness of labor, which is 8 shillings per day, in comparison with 20 shillings per day in most of the Australian gold fields; the reduction in the price of coal, which costs the Kapanga Company 14 shillings 6 pence per ton through using native coal, instead of 38 shillings per ton when formerly using Australian; the suitability of the gold for cyanide treatment, and its nearness to the seacoast.

The Government, besides providing diamond-drilling machinery, are subsidizing the Kapanga Company in sinking a bore hole, which is to go down 1,000 feet below the 850 foot level, the present depth.

At no previous time has there been such activity in taking up new ground as the present, and locally the belief in the permanency and value of the reefs as true fissure veins is very strong. The New Zealand Herald of March 22, 1895, says:

"Our gold fields are now attracting much attention. A number of investors have the past few weeks purchased largely in the leading mines. One good feature is the rapid erection of suitable reduction machinery, the completion of which will, we feel sure, place the Hauraki gold fields soon among the largest gold-producing portions of the world. In comparison with the West Australian gold fields, which recently have been so much to the front, this field possesses true fissure veins of undoubted value. It is easily accessible, water is abundant, coal is cheap, and labor is both plentiful and cheap."

TASMANIA.

[From Statistics of the Colony of Tasmania, 1893.]

TABLE SHOWING THE RESULT OF OPERATIONS OF TASMANIAN GOLD MINES FROM 1884 TO 1893.

Year.	Alluvial mining.		Quartz mining.				Total quantity of gold produced.		Total value of gold produced.
	Gold produced.	Value.	Quartz crushed.	Gold produced.		Value.			
	Oz.		*Tons.*	*Oz.*	*dwt.*		*Oz.*	*dwt*	
1884	11,800	£45,775	35,848	30,539	19	£114,629	42,339	19	£160,404
1885	7,975	31,075	27,092	33,265	19	124,234	41,240	19	155,309
1886	5,750	22,625	24,083	25,264	10	94,625	31,014	10	117,250
1887	6,134	23,663	28,187	36,475	3	134,870	42,609	3	158,533
1888	5,455	21,015	27,231	34,155	19	126,138	39,610	19	147,154
1889	3,170	12,219	32,957	29,162	13	107,484	32,332	13	119,703
1890	5,895	21,185	16,921	17,556		65,929	23,451		87,114
1891	6,759	26,031	25,780	32,444		123,784	39,203		149,816
1892	10,896	42,163	43,334	34,214		131,907	45,110		174,070
1893	7,759	29,952	37,649	29,471		115,922	37,230		145,875

AUSTRIA-HUNGARY.

The production of the precious metals in the Austro-Hungarian Empire in 1893, as reported by the United States ambassador at Vienna, is shown in the following table, compiled from the data furnished him by the Imperial Government:

Country.	Gold.		Silver.	
	Weight.	Value.	Weight.	Value.
	Kilograms.	*Florins.*	*Kilograms.*	*Florins.*
Austria (output of the refineries)	35.17250	52,506	37,344.4680	3,330,265
Hungary	2,499.95192	4,090,881	23,974.8226	2,161,314
Total	2,535.12442	4,143,387	61,319.2906	5,491,579

Representing for gold a value of $1,684,800, and for silver a coining value of $2,548,400. The data of the production of the precious metals in the Empire in 1894 have not yet reached this Bureau, and are therefore assumed to be the same as for 1893 in the table of the world's production of gold and silver.

The gold of the Austro-Hungarian Empire is produced almost exclusively from the deposits of Siebenbürgen. Przibram, in Bohemia, and the gold mines of Rathhausberg, at Gastein, produce only very small amounts. Judging by the present condition of the Austro-Hungarian mines they will add no great amount of gold to the world's production.

The production of silver in the Empire is small. It has been estimated as follows for the period 1888–1892:

	Kilograms.
Bohemia (Przibram)	35, 804
Tyrol	764
Krain	90
Hungary	18, 423

According to Dr. Hauchecorne, the production of silver in Hungary has been very uniform during the last fifteen years.

BOLIVIA.

Concerning the production of silver in Bolivia in 1892 and 1893, this Bureau received the following information from Mr. Gerardo Tralles, acting United States consul at La Paz, under date of March 5, 1894:

The amount of silver ores exported during the calendar year 1892 and first six months of 1893 was as follows:

Source.	Silver ores.	Metals.
1892.	*Marcs.*[1]	*Marcs.*
Compañía Huanchaca de Bolivia	284, 595. 500	616, 274. 570
Compañía Minera de Oruro	99, 361. 388	37, 730. 910
Compañía Aullagas	11, 192. 990	52, 006. 470
Compañía Colquechaca Aullagas	15, 208. 630	94, 536. 610
Compañía Guadelupe	59, 509. 374	5, 434. 340
The Royal silver mine of Potosi	38, 342. 908	....
Total	508, 210. 790	805, 982. 900
1893.		
Compañía Huanchaca de Bolivia	123, 010. 50	270, 601. 89
Compañía Playa Blanca	....	225, 540. 06
Compañía Minero de Oruro	44, 597. 48	57, 404. 69
Compañía Colquechaca Aullagas	10, 014. 24	71, 160. 11
Compañía Guadelupe de Bolivia	40, 340. 80	5, 348. 28
Total	217, 963. 02	630, 055. 03

[1] Equivalent to 0.23 of a kilogram.

The coinage of silver in Bolivia in 1892 was 1,535,340 bolivianos, and in 1893, 1,678,320 bolivianos.

Assuming that the silver product of Bolivia in 1892 and 1893 was equal to its coinage plus its exports of silver in those years, respectively, and that its exports of silver during the second half of 1893 amounted to the same as during the first half, and remembering that each boliviano coined really represents 20¼ grams, fine, we have, for the silver product of Bolivia in 1892, 333,355 kilograms, of the coining value of $13,854,234, and in 1893, 424,074 kilograms, of the coining value of $17,624,515.

According to a report of the British consul at Lima, the silver product of Bolivia in 1894 was about 22,000,000 ounces, fine, of the coining value of $28,444,400, representing 684,418 kilograms, at which figures it appears in our table of the world's production in this report.

The figures under the head "Silver ores" in the table given above represent the weight of the fine silver in the ores.

PRODUCTION OF SILVER IN BOLIVIA IN 1894.

[From Report on the Production of Silver in Bolivia by Mr. Alfred St. John, British consul at Lima.]

The mineral wealth of Bolivia includes silver, copper, tin, antimony, bismuth, gold, and borax. Silver is the most important, the amount to be shipped this year (1894) not falling short of 15,000,000 ounces, while the total output of the mines will be 22,000,000 ounces, in round figures. One-fifth of the total production has to be delivered to the Government for coinage purposes.

Of the total output, the Huanchaca Mining Company will contribute 10,000,000 ounces, the increase in their production being due to the opening of the large reducing establishment at Playa Blanca, near Antofagasta.

I spent a day in the Pulacayo mine, from whence the Huanchaca Company obtains its silver. I found the lode at the bottom of the mine, 446 meters below the main level, to be 12 feet wide, and averaging about 130 ounces to the ton. There appears to be an almost unlimited supply of ore, the calculation being that silver now in sight is not less than 50,000,000 ounces, sufficient to last at the present rate of work for over five years. There is no indication to show any liklihood of the lode giving out, and no reason, therefore, why another 50,000,000 ounces should not be in sight at the end of another five years. In 1893 this company made a profit of 4,542,021 bolivianos, the average rate of exchange during the year being 2s. 2d.

The fact that all laborers in the mines are paid in silver renders the cost of production extremely low, the cost per ounce to the Huanchaca Company being about 1s. 3d. The lesser sterling value of the wages paid compensates, to some extent, for the fall in the value of silver, the wage rate not having risen since the recent heavy depreciation took place.

The other great silver districts are Potosi, Colquechaca, and Oruro. Difficulties of transport have prevented many mines containing rich ores being worked. The railway communication to Oruro will in part remove these obstacles, and we may shortly expect to see the annual output very largely increased.

Beginning with 1887, the production of silver has steadily and largely increased.

The most important mining districts at present are those of Oruro, Colquechaca, Aullagas, Potosi, and Huanchaca. Among these, Potosi, which was discovered in 1545, is world-renowned on account of the large amount of silver produced since that year from the Cerro Rico de Potosi. Its production from 1545 to 1803 was estimated by Humboldt at 33,422 kilograms. After an interruption up to 1854, and after unsuccessful efforts at working the Cerro, the principal lode of the mines was reopened in the year 1886, and the mines have between that time and the end of 1892 produced about 400,000 ounces, or 12,400 kilograms, of silver per annum.

The deposits occur in very numerous quartz lodes, found in very thick quartz-porphyry veins, inclosed in Silurian strata. Lodes in porphyry in similar conditions as in Potosi are also found in Oruro in the northwesterly direction from Potosi. The ores in these veins are rich silver ores. Native silver and silver chloride are found near the outcrop; deeper down, silver glance, arsenious, and antimonious silver sulphites in combination, and at a still greater depth, lead, copper, and zinc ores. Tin is obtained in Oruro from these lodes. In the district of Huanchaca the lodes are found in early trachyte eruptive rocks and carrying as principal ore argentiferous gray copper or fahlerz, silverine ore, zinc blende, and pyrites, all with a small gold content.

The Campagnie des Mines de Huanchaca is said to have produced, from the time of its formation in 1877 to the end of 1892, bullion to the value of $43,033,899. This company has erected a large smelting establishment in Antofagasta, in Chile, for the smelting of its ores. Antofagasta is the starting point of the railway, which stretches as far as Oruro, and which will promote greatly the mining interest of the whole territory. It will also open up the mining districts of Aullagas and Colquechaca, at Challapota. Mining in these regions, especially in the old mines, is extended to a great depth; in Oruro to 1,150 feet and in the Embudo, at Colquechaca, to 1,750 feet.

BORNEO.

Gold alluvions are known to exist in Borneo, on the north side of the island, but they have thus far been of no great importance. According to recent information (Hauchecorne), the working of them is to be begun, and it is intended to erect there an extraction establishment and to introduce the MacArthur-Forrest or cyanide process.

BRAZIL.

In the Report on the Production of Gold and Silver in 1893 it was remarked that in an article in the Economiste Français of September 23, 1893, Mr. Fournier de Flaix wrote: "Gold mines exist and are worked in the majority of the States of Brazil, notably in Ceara, in the State of Bahia, and especially in the States of Minas-Geraes and Goyaz. The annual production is estimated at 10,000,000 francs." And the comment was added: "This Bureau can find no facts on which to base any such production."

Subsequently, a letter was addressed by the Director of the Mint to Mr. Fournier de Flaix, asking him to be good enough to mention on what authority he credited so large an output of gold to Brazil. To this inquiry Mr. Fournier de Flaix replied as follows:

PARIS, *December 6, 1894.*

SIR: Various delays have not allowed me to answer sooner the letter in which you ask me where I found my information on the production of gold in Brazil. I found that information in the work of Mr. Santa Anna Nery, Brazil, 1889, page 75, who estimates the production of the mines of Minas-Geraes alone at 9,150,000 francs per annum.

Recently I read a memoir of Mr. Paul Ferrand on the same mines, in which that production is given at 13,500,000 francs.[1]

My estimates are, therefore, warranted.

With the highest consideration, I am, your devoted servant,

E. F. DE FLAIX.

DIRECTOR OF THE MINT,
Washington, D. C.

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[1] Mr. Ferrand published an exhaustive work on the Minas-Geraes mines in 1894.

In view of the high standing of Mr. Fournier de Flaix as an economist, statistican, and cautious writer, this Bureau feels warranted, after his explanation contained in the above letter, and in the absence of any information from our minister to that country, to place the gold product of Brazil for 1892, 1893, and 1894 at the average between 9,500,000 and 13,500,000 francs, or 11,500,000 francs, or about $2,219,500, representing 3,339 kilograms. It appears in the present report at these figures.

The production of gold in Brazil, carried on principally in the States of Minas-Geraes, Goyaz, and Matto-Grosso, began about the end of the seventeenth century. It reached, according to Soetbeer, its greatest height in the years 1741–1760, in which the average yearly production amounted to 14,600 kilograms.

The great mass of the gold hitherto mined has been derived from superficial gold alluvions which had their origin in the destruction of the old crystalline primitive rock and in the quartz lodes found therein.

In the upland of Minas-Geraes the primitive rock in the gold district consists of mica schists, represented in great part by itacolumite (chlorite-bearing mica schists, talc schists, and quartz schists, with layers of itabarite), and by the rock known to Brazilian miners as jacotinga and decomposed itabarite, carrying quartz noted for its large gold content. Besides these it also abounds in talc and chloride schists. Veins and beds of gold quartz frequently occur in the latter, while in the jacotinga rock the gold is found in seams injected into it in veins, as well as in irregular pockets.

Gold mining is carried on at present principally in the districts of Oruro Preto, in Minas-Geraes, for the most part in the lodes and also in the jacotinga beds. To the latter belongs the Maquiné mine at Marianna, which about the year 1869 had a large production of gold, but has since been abandoned. Isolated masses are found in this mine which were said to have yielded 80 kilograms of gold per ton.

The mines in the vicinity of Oruro Preto consist of lodes in which the gold occurs in combination with arsenico carbonate of lead, argentiferous galena, and the characteristic gangue mineral, tourmaline. Among other places it is found at Passagem, Pary, Faria, and Morro Velho.

These mines are noteworthy for the regularity of the distribution of gold in the matrix of the ore and by their richness. The principal lode of Morro Velho is over 30 meters in thickness. Besides gold, it contains magnetic iron pyrites and arsenico-carbonate of lead, and has gangue mineral of quartz calc-spar.

According to Hauchecorne, the ores manifest a gold content uniform in the depth, which now exceeds 200 meters. It is thought that the gold production of Brazil will be revived by further search after the original beds of the formerly very rich alluvial gold deposits, and by improvements in mining technics.

The following paper, copied from the New York Engineering and Mining Journal of February 9, 1895, would go to show that Brazil is rich in gold:

GOLD MINES IN BRAZIL.

Brazil is rich in gold mines, and could foreigners secure protection in all mining rights these mines could be profitably worked. From their first discovery in the sixteenth century up to the present date there never was, nor is there now, a single mine properly worked by efficient machinery and improved methods. Every mine yet worked has lost a paying per cent of gold with the tailings.

To thoroughly understand the present condition of the mining industry we must go back and trace it from the beginning through its vicissitudes up to the present. While gold in some quantity has been discovered in nearly every State of Brazil, yet the recognized regions where it has been found in paying quantities are few, namely, in certain sections of the States of Minas-Geraes, Goyaz, Matto-Grosso, and Bahia.

Gold was discovered in many parts as early as the latter half of the sixteenth century. The working of the mines to any extent did not begin before 1700, and since then the State of Minas-Geraes has given more gold to the world than all the rest of Brazil combined, although Matto-Grosso and Goyaz from 1720 to 1830 supplied large quantities of gold. Since then the industry has declined, and has now almost ceased to exist. To show the importance it assumed in an early age, we read that in Goyaz there were in 1730 some twelve gold mines being worked, and in one alone, the Pilar, there were 9,000 slaves employed; and in the mines round about the old capital, Matto-Grosso, in 1800 over 20,000 people were engaged in mining.

As for the richness of product of individual mines, the Gongo Socco ranks among the first in the world, having produced in thirty-five years $25,000,000, while the Morro Velho, or, as it is called, the São João del Rey mine, has produced $28,750,000, and yet has in sight fifty years more of work.

The cause that forwarded the production of gold in Brazil in early days was the cheapness of labor and provisions. A man slave between 16 and 26 years of age was worth in 1803 $67. At that time companies were formed, each share being worth $200, with the option of paying in money or three slaves. His keep cost little, between 5 and 10 cents per day. He even could be hired from his owner for from 16 to 20 cents per day.

Up to that time the gold mining had been principally confined to the alluvial washings of auriferous soil that paid with this cheap labor at least 100 per cent. Quartz mines were only touched where they were found extremely rich, or in a state of decomposition that rendered them easily worked. Explosives were too expensive and difficult to obtain.

The mode of working hard quartz was to heat it with fires and then pour cold water upon it, crack it, pry out the pieces, powder it up by hand, and then wash it. If written records are few and unsatisfactory that tell of the number of slaves and their products in the toil of centuries, he who travels through the gold and diamond regions of Brazil will not fail to be impressed with the still existing evidence of the work of more than 1,000,000 slaves. Mile after mile of upturned earth, thousands of piles of rock, débris that has been washed and left, scores of deep cuttings in a hundred hills, the mark of the old water ditch that follows the mountain side leagues away, the constantly recurring scene of old broken walls that mark the spot where stood the corrals.

The price of slaves increased, provisions grew dearer, and the tax collector more exacting. Placer mining became less profitable, and then the owner of slaves began to look for employment in other industries. Coffee, from the beginning of this century, had begun to attract attention; sugar, with slave labor and a foreign market, was also profitable, and the war in the United States brought cotton into great demand; so these channels being opened, slave owners began to leave the mines and go into other industries.

The concessions or special privileges given by the Government, which owned all mining rights, also kept out many investors. The Government often gave this privilege to one person, he alone having the right to explore or work mines in a certain section, which sometimes extended over half a state. The owner of this concession seldom did anything to develop the mines, and, as a rule, it was lost after a length of time for not working. Then some one else would get the same privilege, or old privileges were renewed. Sometimes some small mine or rich alluvial washing was worked by a small force to hold a concession of half a state, which the law permitted.

A few favored sections that were very rich and conveniently situated continued to produce gold from quartz mines. Some English capitalist put to work a few wooden stamp mills, with reasonable results. Labor was cheap, but the enormous per cent exacted by the Government for mining privileges was ever a fatal barrier to the extending of this industry, and the continued war waged by mine owners on the one hand for the reduction of these taxes, and the Government on the other, is an epoch in the history of Brazil that has affected wonderfully her destiny and set her back one hundred years in prosperity. The advancement of this industry would have carried with it all others.

From the discovery of gold up to 1713 a tax of one-fifth of the output went to the Crown of Portugal. Then a company in Minas contracted from the Government certain mines, paying yearly 960 pounds weight of gold. The Government kept increasing the tribute until 1733, when it demanded 3,200 pounds of pure bullion. At this time a law was passed requiring the payment of $115 for each slave employed. This continued until 1751, when a new law was passed that levied a tax of one-fifth of all products. The amount of this tax can be judged by one example. In the mine of Gongo Socco, from the year 1826 to the year 1830 the Government collected $1,250,000 for mining privileges and $75,000 as duty on exportation of gold. The total amount produced was $6,000,000, or 30,000 pounds weight; and the Gongo was a mine bought and paid for by a foreign company with a special Government concession. Such have been the laws that existed up to the signing of the constitution of 1891; that is, a tax of from 5 to 25 per cent on gross products as well as duties on exportation.

When the discoveries of gold in California were made in 1849, and in the wake of this the discoveries of Australia and South Africa, as these countries treated the newcomers more liberally than Brazil had ever done, this country was forgotten.

Another drawback to investing money in Brazil is the vagueness and insecurity of titles to real estate. This alone has frightened many would-be purchasers away. The old division of one hundred years ago is to-day the holdings of many owners. Buy up fifty parts, all that can be found when the property is cheap, and when it is developed and made valuable the owners of the other fifty turn up and demand an exorbitant price for their interest.

Recently the writer made surveys and plans of some very important gold mines in the Minas-Geraes. One of these properties was being worked by a wooden stamp mill. Five days I watched the work, and was present at the wash-up and weighed the gold extracted. Five men worked in the mines, one with pack mules, and two at the mills. Those at the mines went down the shaft some 300 feet and brought out the ores on their backs. Pack mules were loaded with 130 pounds each. The mill was half a mile away. Two tons of ore was their best day's work, and their average was $6 per day. The owner confessed that he lost at least 40 per cent of the gold by his rude process. I am sure that this mine and others like it are good if labor-saving machinery and improved processes in mining were adopted. This mine has recently been sold to an American company for $250,000. The quartz ledge is often found of good thickness, with a convenient dip, while the rock carries plenty of gold. It is said that 60 per cent free gold is about the general average; the rest is held by the sulphurets. The process of extracting it from these has never yet been introduced into Brazil.

The general appearance of Minas-Geraes, the most noted region for gold, is about as follows: It is almost barren of virgin forest; all heights are barren, save for a thin, wiry grass; along the margin of streams frequently a second growth of woods make a fringe of deeper green; the country is very broken; hills vary above streams from 400 to 1,000 feet; the inclination of hillsides is from 35° to 60°; water is reasonably plentiful, and streams are rapid and without valleys. The gold is generally found from 2,000 to 3,500 feet above sea level.

In Goyaz, Matto-Grosso, and Bahia the country is very much the same, save the hills are less abrupt and not so high above the streams.

Clause 17 of article 75, in the declaration of rights adopted in the constitution of the new Republic in 1891, is said to cure the concession difficulties. It is a long step in the right direction; that is, giving the minerals to the landowners. It reads:

"Mines belong to the owner of the soil, under the limitations to be established by law to encourage the development of this industry."

Now, the worst to be expected is a heavy export duty on products of the mines, which the States have a right to levy under the constitution. The finances of the States of Minas-Geraes and Bahia are satisfactory and might encourage the industry, but Goyaz and Matto-Grosso are poor, and might enact severe laws, especially if that industry is in the hands of a foreigner. More yet is needed beyond the guaranties in the declaration of rights. Wise legislation in the direction of legalizing land titles, demanding surveys, and registration of title deeds must take place.

BRITISH INDIA.

This Bureau has received the following communication showing the gold output of India (a provisional statement only) and the import of gold bullion into India from China in 1894:

GOVERNMENT OF INDIA,
FINANCE AND COMMERCE DEPARTMENT,
Calcutta, March 19, 1895.

SIR: In continuation of the letter from this department, No. 3319A, dated July 4, 1894, I am directed to attach two statements, one showing the weight of gold produced from the mines in India during the calendar year 1894, and the other showing the weight of gold imported into India from China during the same period. The China returns do not distinguish between bullion and coin, but it may be taken that the gold imported from that country is all uncoined.

The statement of the production of gold now furnished is provisional, and further information which is awaited from Mysore will be sent to you on receipt.

I have the honor to be, sir, your most obedient servant,

G. H. N. HART,
Officiating Assistant Secretary to the Government of India.

DIRECTOR OF THE MINT,
Washington, D. C.

STATEMENT SHOWING THE WEIGHT OF GOLD PRODUCED FROM MINES IN INDIA DURING THE CALENDAR YEAR 1894.

Where produced.	Weight of bar gold.
	Kilograms.
State of Mysore	6,534.391
Madras Presidency	10.062
Total	6,544.453

STATEMENT SHOWING THE WEIGHT OF GOLD BULLION AND COIN IMPORTED INTO INDIA FROM CHINA DURING THE CALENDAR YEAR 1894.

Whence exported.	Where imported.	Weight of gold.
		Kilograms.
China	India	2,483.989

INDIAN GOLD MINES.

[From the London Economist, January 19, 1895.]

Speaking generally, the group of mines situated in the Colar district of Southern India produced less satisfactory results last year than in the preceding year, for though the aggregate production showed a slight increase the tonnage crushed was substantially larger. The average yield last year was barely 1 ounce 3 pennyweights of gold to the ton of quartz treated, compared with over 1¼ ounces to the ton in 1893. The first half of the year gave very poor results in the Mysore and Nundydroog mines, but in the second half both mines did much better. The most notable feature is that the Champion Reef Company, which only commenced crushing in July, 1892, has lately had the greatest monthly production, the yield being 1¼ ounces of gold to the ton. In the following table the tonnage treated and the gold produced in the past two years are shown:

District.	1893.		1894.	
	Tons.	Ounces.	Tons.	Ounces.
Ooregum	62,822	75,023	45,294	68,224
Champion Reef	22,075	31,416	44,644	53,516
Mysore	48,708	65,409	60,756	52,115
Nundydroog	25,760	31,223	29,730	29,745
Balaghat	5,640	7,252	4,265	5,322
Mysore Reefs	....	....	349	325
Total	165,005	210,323	185,038	209,247

Since regular crushings commenced, in 1884, nearly 688,000 tons of quartz have been milled from the Indian mines, producing gold of the value of about £3,726,000, or about £5 8s. for every ton of quartz treated. As we have said, the later returns have shown an improvement, and as the Tank Block property, jointly owned by the Mysore-West and Mysore-Wynaad companies, is on the point of commencing milling operations, the prospects of the district appear to be brightening. It is rather surprising that so few of the Indian companies started between 1879 and 1885 have proved successful, but the reason is to be found mainly in the fact that the Wynaad district, about which the balance of expert opinion was so sanguine, proved completely unworkable on a commercial basis.

INDIAN MINERALS.

[From the Board of Trade Journal, London, January, 1895.]

The Calcutta Capital, in its issue for October 24, considers the section of Dr. Watt's recently published memorandum which deals with the mineral and natural resources of India, past and present, to be of special interest at this time, when the subject of mining laws and regulations and that of a possible revival of the gold industry in Assam are prominently before the public.

* * * * * * *

That the resources of the country in the precious metals were once of magnitude can scarcely be doubted from the mass of evidence that has been collected by Dr. Watt and other authorities.

At the present day gold is known to exist in many places in upper and lower Burmah and in Assam. Explorations are being carried on in an ancient gold-mining region in the Raichur Doab, within the Nizam's dominions, but, generally speaking, it may be said that the production of the yellow metal in India, as far as our actual knowledge constitutes a guide, is inconsiderable and precarious, except in respect of Mysore, where promises of continued supplies seem assured.

In this State during 1890 the output was estimated in value at a crore and a quarter. Rumors, however, were current not so long ago of brilliant results achieved at the Nundydroog and Champion reefs in Southern India. Again, silver, although widely distributed throughout the country, exists in quantities even more diminutive than the metal just referred to.

[From the London Mining World, January 19, 1895.]

TABLE SHOWING THE OUNCES AND VALUE OF GOLD PRODUCED BY THE COMPANIES NOW AT WORK IN THE COLAR FIELD, OF MYSORE, INDIA, FOR THE YEAR ENDED DECEMBER 31, 1894.

Month.	Mysore.		Nundydroog.		Balaghat-Mysore.	
	Ounces.[1]		*Ounces.*[1]		*Ounces.*	
January	5,012	£19,574	2,097	£7,709	288	£1,084
February	4,709	18,381	1,728	6,376	364	1,394
March	4,033	15,616	1,769	6,572	409	1,578
April	4,184	16,259	1,622	5,982	443	1,725
May	4,148	16,036	1,720	6,350	506	1,935
June	3,395	13,146	2,186	8,231	678	2,625
July	3,774	14,554	3,227	12,032	754	2,922
August	4,526	17,562	3,020	11,279	759	2,953
September	4,209	16,373	3,074	11,409	705	2,729
October	4,614	17,872	3,005	11,223	525	2,032
November	4,622	17,984	3,101	11,585	125	484
December	4,889	18,945	3,106	[2]12,036	115	[2]446
Total	52,115	202,302	29,655	110,784	5,671	21,907

Month.	Ooregum.		Champion reefs.		Mysore-West and Wynaad.		Mysore Reefs.	
	Ounces.[1]		*Ounces.*		*Ounces.*		*Ounces.*	
January	6,589	£24,539	3,040	£11,537	....	......	....	......
February	5,905	22,129	3,099	11,771	....	......	....	......
March	6,602	24,828	3,267	12,397	35	£125	....	......
April	6,008	22,522	3,294	12,535	19	[2]74	....	......
May	6,666	24,954	3,503	13,248	....	......	....	......
June	5,100	18,926	4,100	15,624	31	[2]109	....	......
July	5,137	19,077	5,289	20,123	37	[2]144	90	[2]£349
August	5,207	19,416	5,501	20,959	20	[2]78	....	......
September	5,297	19,750	5,597	21,366	70	[2]272	29	[2]113
October	5,269	19,590	5,603	21,391	61	[2]237	42	150
November	5,319	19,754	5,605	[2]21,720	....	......	....	......
December	5,325	[2]21,300	5,618	[2]21,770	....	......	53	[2]206
Total	68,424	256,785	53,516	204,441	273	1,039	265	1,027

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[1] Inclusive of tailings.

[2] Estimated at £3⅞ per ounce.

TOTAL VALUE OF MONTHLY YIELDS.

Month.	1890.	1891.	1892.	1893.	1894.
January	£33, 054	£39, 899	£44, 610	£63. 373	£64, 443
February	37, 877	39, 352	44, 821	63, 182	60, 051
March	37, 340	39, 171	44, 155	66, 359	61, 116
April	30, 854	36, 490	44. 929	69. 330	59, 097
May	30, 251	40, 682	47, 681	67, 909	62, 550
June	32, 657	41, 676	45, 128	63, 738	58, 661
July	31, 843	42, 872	50 772	63, 322	69, 201
August	31, 801	43, 331	56, 483	63, 003	72, 247
September	32, 800	43, 086	59, 166	64, 672	72, 012
October	36, 721	46, 644	60, 926	66, 310	72, 495
November	38, 287	45, 006	60, 787	66, 605	73, 527
December	39, 472	44, 683	62, 509	68, 431	74, 703

The returns of the gold output of India in 1894 (provisional) sent this Bureau by the Indian Government place it at 6,544.453 kilograms. The output cited by the London Economist is 209,247 ounces, or 6,508 kilograms, while that obtained by the addition of the figures quoted from the London Mining World make it 209,919 ounces, or 6,529 kilograms. This Bureau publishes the amount sent it by the Indian Government as the product of standard (.916⅔ fine) gold in India in 1894, viz, 6,544.453 kilograms of standard fineness, or 5,999 kilograms, fine, of the value of $3,986,900, at which figure it appears in the table of the world's production of gold and silver in the present report.

CANADA.

Concerning the production of gold in Canada in 1894 this Bureau has received the following:

GEOLOGICAL SURVEY OF CANADA,
Ottawa, April 16, 1895.

SIR: Mr. Archibald Blue, director of the bureau of mines of the Province of Ontario, has forwarded me your letter of the 8th instant, in which you ask for the estimated production of gold in Canada during the calendar year 1894. I have much pleasure in furnishing the figures, as follows:

Estimated production of gold in Canada, 1894, 52,992 ounces; estimated value, $954,451.

In estimating the value, Nova Scotia and Ontario gold is reckoned at $19.50, Quebec gold at $18, and British Columbia and Yukon gold at $17 per ounce.

The figures given are still subject to correction, as complete returns from British Columbia and Nova Scotia have not been received.

A final statement will be sent as soon as possible.

Yours, truly,

GEORGE M. DAWSON, C. M. G., LL. D., F. R. S.,
Deputy Head and Director, Geological Survey of Canada.

DIRECTOR OF THE MINT,
Washington, D. C.

Subsequently Mr. Dawson favored the Bureau with the more detailed information contained in the following letter and table:

GEOLOGICAL SURVEY OF CANADA,
Ottawa, July 2, 1895.

SIR: In reply to your letter of June 28 I beg to inclose the information asked for by you in respect to gold and silver production in Canada during the calendar year 1894.

This we believe now to be correct, in so far as it is possible to arrive at precision. In the statement the average value per ounce of gold produced in each Province is given; this can be approximate only, but it gives the best information we possess whereby to convert the ounces as produced into ounces, fine. The silver is supposed to be fine.

Yours, truly,
GEORGE M. DAWSON, C. M. G., LL. D., F. R. S.,
Deputy Head and Director, Geological Survey of Canada.

DIRECTOR OF THE MINT,
Washington, D. C.

GOLD AND SILVER PRODUCTION OF CANADA, 1894.

Province.	Gold.			Silver.	
	Ounces.	Value.	Price per ounce.	Ounces.	Value at 63 cents per ounce.
Nova Scotia	[1] 19,342	$377,169	$19.50	....	....
Quebec	[2] 1,622	29,196	18.00	101.318	$63,830
Ontario	[3] 2,032	39,624	19.50	....	....
Northwest Territories and Yukon district	[4] 8,235	140,000	17.00	....	....
British Columbia	[5] 26,827	456,066	17.00	746,379	470,219
Total	58,058	1,042,055	....	847,697	534,049

[1] Returns give number of ounces only; value estimated.

[2] Returns given in ounces, without value, and vice versa.

[3] Returns given in ounces or in ounces and value.

[4] Value estimated and converted into ounces.

[5] Actual value converted into ounces.

In the table of the world's production of gold and silver in 1894, therefore, the gold product of Canada has been placed at $1,042,100, corresponding to 1,568 kilograms, fine, and its silver product at 847,687 ounces, or 26,371 kilograms, fine, of the coining value of $1,096,000.

THE GOLD FIELDS OF ONTARIO.

[From Third Report of the Bureau of Mines for 1893, Toronto, 1894.]

Once about a quarter of a century ago, in Hastings County, and again about ten years ago, in the Lake of the Woods region, discoveries of gold, working of mines, and milling of ores had encouraged the hope that Ontario might become a gold-producing country. But, for one cause or another, after much money and labor had been expended upon properties and works, the conclusion appeared to be reached that the right conditions did not exist, or if they did that the energies of those who ventured upon the enterprise were either inadequate or were misguided and misapplied. Past experience, however, has not persuaded the men of our day that there is not gold in our Province in workable quantities in districts not hitherto explored, nor even that in fields where operations were formerly carried on without success better methods and appliances may not yield profits to those who have the courage to undertake their development with more capital, modern equipment, and new modes of treatment. It was remembered, perhaps, that in the early days of quartz mining in California and elsewhere, with the old-time processes of treatment, more gold went off with the tailings than was caught and saved; and it was no doubt believed that with the more scientific methods now in use ores might be treated with profit which twenty-five or thirty years ago were thrown into the dump. It came to be known also that gold was not limited to Hastings County or the Lake of the Woods district, and confidence was felt that in the wide area over which formations which may be gold-bearing extend there is a chance for making valuable discoveries. Interest in prospecting for gold in various parts of the Province began therefore to revive, new discoveries were reported, and in several localities mining and milling operations started to attract notice. Silver mining had enjoyed a long career of prosperity, and the rich and extensive mines of the Western States and Territories had enabled their owners to amass great fortunes. But when prices fell below a point at which it was alleged production ceased to be remunerative, the millionaires of the West closed their mines and works.

It was not long in the United States until capital and industry commenced to take hold of gold properties, to explore and work them; and the same thing happened in Ontario also, after the silver mines of Lake Superior had closed, wherever discoveries of gold were made which seemed to give promise of reward to enterprise. Other causes had also influenced the movement toward an exploiting of gold fields, the most potent of which doubtless was the collapse of the iron trade. So many iron mines were shut down in the United States and so many furnaces blown out that men with capital to spare were ready to take risks in any new venture which had in it the appearance of a healthy speculation. Every business undertaking is more or less uncertain; and while in gold mining there are perhaps more blanks than prizes drawn, the blank as a rule deters few and the prize encourages many.

We may have too much silver or iron, lumber or wheat, but no one fears that we can have too much gold. Moreover, while almost every other article of commerce needs to be pushed upon the market, requiring the service of an army of commercial agents and middlemen, no trouble is ever experienced in disposing of gold. It has only to be deposited in the bank or expressed to the mint, and forthwith there is an end to the anxieties of the producer. Other occupations may afford larger profits, but there are none in which there is less uncertainty in making sales, and none in which the fluctuations of prices are maintained within narrower margins. And so the industry of gold mining will often attract capital and labor when all other industries are in a state of paralysis. It can only be carried on at a loss when the cost of producing a dollar's worth of gold is more than a dollar. Whether it will be profitable in Ontario or not at this third effort to establish it remains to be proven.

The renewed interest in prospecting in various localities, the discoveries reported, and the commencement of mining and milling operations on several new tracts, as well as resumption of work after a period of inacitivity on the two old ones, suggested the propriety of devoting special attention to our gold fields during the past summer. Two new fields have since come into notice, each of which may possibly prove to be of greater value than any of the ones referred to here. On Rainy Lake gold was discovered upon the American side of the international boundary in the month of August last year, and since then numerous gold-bearing vein have been explored on the Ontario side of the lake and on the Seine and Maniton rivers, the shows of which are so good as to have attracted to the region large numbers of prospectors. Around Lake Wahnapitae, in the eastern part of the Province, gold was discovered several years ago, but it is only very recently that ore of much promise has been found there. If the samples shown are any indication of the general character of the ore, the Wahnapitae country will also merit and reward the attention of the gold seekers.

GOLD MINING IN CANADA.

[From the Board of Trade Journal, London, May, 1895.]

The Toronto Monetary Times of April 12, with regard to gold mining, says what is needed for the development of Quebec's gold industry is the examination of her gold fields, from an economic point of view, by a thoroughly practical as well as scientific mining engineer.

There remains to be mentioned the gold fields of Ontario, and while it is admitted that this Province is not so much in need of good advice in this industry as Quebec, the gold fields are reported young as regards Rainy River and Lake of the Woods, and refractory with respect to Marmora and Madoc.

In a report in April, 1894, Mr. Archibald Blue, director of the bureau of mines for Ontario, stated that the prospect of gold mining in the Province had greatly improved, and that there was promise of increased activity. The report itself declares that many believe that modern equipment and new modes of treatment may result in profit on properties not hitherto successful. The Rainy Lake discoveries of 1893 are mentioned, and around Lake Wahnapitae ores of much promise will, if the samples indicate the general character of the ore, "merit and reward the attention of the gold seekers."

But not to go so far afield as either of these places, a dozen pages of the report are devoted to the gold mines of the Madoc and Marmora region. Respecting the quartz veins that characterize part of Marmora and Belmont townships, different reports, says Mr. Blue, concur in the opinion that the veins are true lodes, that the cost of mining and milling the ore should not exceed $4 per ton, and that an average yield of $10 per ton should realize a good profit.

GOLD MINES OF NOVA SCOTIA.

[From Mineral Development of Nova Scotia, 1894, by E. Gilpin, jr., A. M., F. G. S., F. R. S. C.]

As already noted, the gold fields occupy the Atlantic coast of the Province. The age of the strata, in a paper read by the author before the American Institute of Mining Engineers, was referred to as equivalent to the Lower Cambrian or Longmynd Series of Europe. The numerous bosses and dikes of granite which intersect the gold fields can be determined as of an age not earlier than the Lower Carboniferous. They need not be further mentioned here, as they seem to exert no influence on the auriferous values of the rocks they intersect.

The auriferous horizon comprises two divisions, the upper containing dark pyritous slates, with beds of quartzite, and carrying veins of quartz, usually small and irregular, but often showing gold. The lower division presents alternations of compact quartzites, frequently feldspathic, but rarely calcareous, with argillaceous slates, sometimes magnesian or chloritic, and includes numerous quartz veins. The thickness of the lower group has been estimated at about 10,000 feet, that of the upper at over 4,000 feet.

Estimates have placed the area of these rocks, after deducting the granitic masses, at about 3,000 square miles. This great mass of sediments has been folded in undulations having an east and west course. These foldings have in some cases been carried far enough to cause overturn dips. This force, acting at right angles to the coast line, has been followed by transverse foldings. At points where the overlying pyritous slates have been denuded the crests of these anticlinals present the lower or quartzite series, usually with vertical or heavy dips.

The auriferous quartz bodies follow the course of the beds of the lower series as they run in their divergent dips and as they sometimes sweep around the ends of the anticlinals. The quartz bodies at first sight present the appearance of beds contemporaneous with the strata surrounding them. A closer study, however, would classify them as veins; thus they are found to pinch out, and the fracture to continue to pass from one stratum to another, to show banded structure, to throw out feeders, to hold inclusions of slate, horses, etc.

Their formation may perhaps be most readily explained by supposing that the strata, consolidated and metamorphosed, opened along lines of least resistance during the process of folding, and that these openings, more or less affected by water, were filled with quartz, etc. There are abundant traces of subsequent faulting, etc., with and without vein filling. In some cases these true veins are auriferous, but the bulk of the gold has come from the strata veins.

The thickness of the veins at present worked varies from 2 inches to 12 feet. The usual width is from 5 to 10 inches. The horizontal extension varies from a few hundred feet to over 2 miles, and workings have been carried to a vertical depth of nearly 600 feet. The minerals usually associated with the gold are sulphides and arsenides of iron, galena, blende, copper pyrites, oxide of iron, copper glance, molybdenite, etc., none of these, however, occurring in quantities of economic importance.

The gold occurs in the veins in pay streaks. Their forms and inclination are irregular, their horizontal dimensions varying from 50 to 300 feet, and their depth varying up to 500 feet. In addition there are beds of slates carrying numerous irregular veinlets of quartz which are crushed for a yield of from 3 to 6 pennyweights per ton. It will probably be found in the future that these low-grade deposits will prove more certainly profitable than the thinner (if richer) quartz veins. Hitherto alluvial mining has received little attention in Nova Scotia, although there are many places that should repay search. In many of the mining districts it has proved profitable to run the surface ground through a mill.

The veins are almost invariably opened by shafts sunk on the dip of the vein. Shafts are sunk from 80 to 200 feet apart, and at a depth of say 50 feet stopes are commenced directly from the shaft, which is protected by blocks of the vein or closely packed scaffolds. The work is done by underhand stoping, usually with two men to a drill. dynamite or powder being the explosive used, according to the hardness of the rock. The ore is thrown to the level and barrowed to the nearest shaft. The hoisting is usually by means of friction gear from an engine placed at a central point. It is customary to make the "cutting in" in the hanging wall and to leave the vein standing until it is bared to give ore enough for a crushing. This prevents waste of the vein matter, and it is less exposed to the miners.

Mining in these rocks usually presents few difficulties. The strata are hard and firm and readily handled by timber, etc. These properties naturally insure little leakage of water, and the pumping power is usually small, except where the location of the mine permits the ingress of surface water. The quartz is broken to suitable size by hand or by a rock breaker and fed, often automatically, to the stamps. The mills here are usually small—two or three batteries of five stamps each. The stamps weigh from 600 to 800 pounds and run at from 30 to 50 drops a minute, but a quicker speed has been successfully tried at some of the mills. The gold is amalgamated in the batteries without plates. The tailings are passed over plates, and in some cases vanners are employed to take out the sulphides.

The output of the mines, according to the returns received from the mills, has varied between 15,000 and 26,000 ounces a year, employing about 400 miners. The following general statement for the year 1892 includes the various districts, their yields, etc.:

GENERAL STATEMENT OF GOLD PRODUCTION FOR THE YEAR 1892.

District.	Number of mines.	Days' labor.	Mills.	Tons crushed.	Yield of gold per ton.			Total yield of gold.		
					Oz.	*dwt.*	*gr.*	*Oz.*	*dwt.*	*gr.*
Tangier, Mooseland	2	3, 172	2	311	0	6	15	103	8	0
Oldham	2	17. 032	2	2, 259	1	7	9	3. 093	13	2
Caribou, Moose River	4	14, 309	4	7, 189	0	6	11	2, 335	16	10
Stormont	2	18, 094	1	3, 625	0	13	18	2. 482	11	2
Salmon River	1	11, 702	1	4, 220	0	4	22	1, 042	10	0
Sherbrooke	3	4, 470	2	893	0	4	0	179	8	20
Montague	1	6, 640	1	1, 716	1	5	15	2, 201	10	0
Malaga	2	7, 772	2	2, 720	0	19	12	2, 656	5	14
Waverley	2	9, 057	1	3, 154	0	5	17	906	11	0
Uniacke	3	12, 006	2	786	2	18	12	2, 300	0	14
Lake Catcha	2	5, 284	2	2, 467	0	8	11	1, 046	18	16
Fifteen-Mile Stream	2	7, 825	1	2, 412	0	12	13	1. 236	17	0
Unproclaimed and other districts	4	3, 398	3	800	0	10	7	412	13	0
Total	30	120, 761	24	32, 552	....			19, 998	3	6

PROGRESS OF GOLD PRODUCTION IN BRITISH COLUMBIA.

[From the Board of Trade Journal, London, March, 1895.]

* * * * * * *

The mining industry was actively pursued, and much is expected to be heard this year of Kootenay, Cariboo, and other districts. Over a score of new mining companies were formed during the year. The exports of gold dust during the year were of the value of $380,055, as against $316,270 in 1893. West Kootenay alone shipped during 1894 silver to the value of $400,000; gold, $175,000; lead, $180,000; copper, $25,000; a total shipment of the value of $770,000.

CHILE.

This Bureau has received no official information of the production of gold and silver in Chile for 1892, 1893, or 1894. The Handels-Archiv publishes the following table of the exports of the precious metals from that country in 1892 and 1893:

EXPORT OF GOLD.

Year.	Description.	Weight.	Value.
		Grams.	*Pesos.*[1]
1892	Gold in bars and lumps	954, 548	783, 638
1893	do	753, 452	602, 761

[1] The peso is worth 38 pence in gold.

EXPORT OF SILVER.

Year.	Description.	Weight.	Value.
		Grams.	*Pesos.*
1892	Silver in cakes and bars	138, 845, 378	5, 017, 390
	Silver ores	920, 128, 000	419, 301
1893	Silver in cakes and bars	140, 368, 647	4, 418, 072
	Silver ores	329, 991, 000	206, 996

No gold was coined in Chile in 1892, 1893, or 1894. Assuming that the production of gold and silver in the Republic in those years was equal to the coinage of these metals plus the exports of the same, we should have for the gold product of the country:

In 1892, 783,638 pesos, at 38 pence per peso, or 29,778,244 pence, equals $603,816, corresponding to 908.54 kilograms, fine.

In 1893, 602,761 pesos, at 38 pence per peso, or 22,904,918 pence, equals $464,444, or 698.83 kilograms, fine.

In 1894, assumed to be the same as in 1893, viz, 698.83 kilograms, fine.

For the production of silver we have:

CHILEAN PRODUCTION OF SILVER, 1892–1894.

Year.	Description.	Amount.
1892	Coinage	Nil.
	Exports of silver in cakes and bars	$3,366,045
	Exports of ores	323,082
	Total	[1] 4,189,127
1893	Coinage	481,405
	Exports of silver in cakes and bars	3,404,253
	Exports of ores	159,495
	Total	[2] 4,045,153
1894	Coinage	121,779
	Exports assumed to be the same as in 1893	3,563,748
	Total	[3] 3,685,527

[1] Representing 100,797 kilograms, fine.

[2] Representing 97,333 kilograms, fine.

[3] Representing 88,680 kilograms, fine.

According to the data collected by Dr. Soetbeer, the production of gold in Chile reached its greatest height in the first decade of this century, while its production of silver at that time was unimportant. The production of Chile averaged annually 3,110 kilograms of gold and 7,000 kilograms of silver. Since then the output of the latter has increased extraordinarily, while that of gold has declined. Recently, however, the production of gold has again increased.

The greater part of the gold is found in old and recent alluvial deposits, known to exist at numerous points, and which are worked at present at Andacollo, Illapel, and Tamaya, in the province of Coquimbo, at Petorca, in Akoncagua, Talka, and La Leona near Rancagua, etc. Recently rich beds are said to have been found at Guanaco.

Lode mining is carried on also at Illapel and Combarbala, in the province of Coquimbo. These lodes are found partly in granite, partly in company with trachyte lodes in metamorphic beds, running parallel with the Cordilleras, which carry chiefly copper pyrites and iron pyrites.

In statistical data of the production of gold the gold contained in exported copper is included.

Silver is obtained almost exclusively in the two celebrated lode deposits of Carocoles, near Altacama, and Chanarcillo, south of Copiapo.

The latter was discovered in 1832 and the former in 1870. Both have produced extraordinarily large amounts of silver.

The lodes are situated in the Jura formation and contain in their upper levels chiefly native silver, bromide of silver, and chloride of silver; deeper down, combinations of sulphurous, arsenious, and antimonious silver, which are displaced in the lower levels by base ores of copper, lead, and zinc, the same as in Potosi, Oruro, and Bolivia.

According to Dr. Hauchecorne, to whom this Bureau is indebted for much information contained in this Report, the production of these lodes has decreased in latter years.

CHINA.

This Bureau estimates the annual production of gold in China to be equal to the sum of the yearly exports of that metal from the Empire, in the form of gold bullion, to Great Britain and India. The exports of gold bullion from China and Hongkong to Great Britain in 1894 amounted to 371,708 ounces, or 11,560 kilograms (.916⅔ fine).

The export of gold from China to India in 1894 was, according to the information furnished this Bureau by the Government of India, 2,484 kilograms (.916⅔ fine). The total export of gold, therefore, from China to Great Britain and to India in 1894 was 14,044 kilograms of standard gold (.916⅔ fine), or 12,875 kilograms, fine, representing $8,556,844, at which figures the product of gold in China in 1894 is placed in the table of the world's production of gold and silver in this report.

The export of gold bullion from China to Great Britain in 1893 was 237,521 ounces, and to India 126,237 ounces, a total of 363,758 ounces, British standard (.916⅔ fine), equal to 333,444.83 ounces, fine, representing 10,372 kilograms, of the value of $6,892,916, at which figures it appears in the table of the world's production of gold and silver in the present report.

Dr. Hauchecorne says in the exhibit laid by him before the German Silver Commission of 1894 with reference to the production of gold in China:

> The fact that large quantities of gold are exported from China is not sufficient proof that workings there are in actual operation. It is well known that there are in China and Australasia a very large number of Chinese engaged in the production of gold individually in a small way, and that their production escapes all official record.
>
> It is said that they carry the gold they mine with them to their homes, where it is consumed only to a very small extent, the larger part of it being exported.
>
> The total of these small exports may amount to large sums. Thus it is said that the rich gold field of Sandhurst, in Victoria, the statistically demonstrated total production of which was 11,500,000 ounces from the time when it was opened up in 1851 to 1893, was less by 4,000,000 ounces than the amount of gold actually produced, which 4,000,000 ounces were carried away by Chinese laborers and no record of them kept.

The fact, however, that the gold bullion exported from China in a year may not be all produced from mines located in China itself is no reason why China should not be credited with it; for, as was observed in the last report of this series, page 193:

> The gold exported from China is either (1) gold recently produced in China itself or (2) gold carried into China by Chinese laborers in Australia or California, or smuggled from Siberia, Korea, or elsewhere, and which has escaped being recorded as Australian, American, Korean, or Russian gold, or (3) gold of Chinese or foreign unrecorded production which has long been hoarded in the Empire.
>
> If it belongs to the first class of gold above described it certainly should be classed as gold of Chinese production; if to the second, it should be awarded a place somewhere in the world's production of that metal, and since it has not been credited to the country in which it was mined there is no duplication in the sum total of the world's annual production in crediting it to China; while, if it belongs to the third class, it must be considered, for all the purposes of western civilization, and for all the purposes for which the statistics of the production of the precious metals are so industriously collected, and which alone gives such statistics a value, gold newly produced in China, just as much as if it were recently washed from the sands of a Chinese river or crushed from the rocks of a Chinese mountain.

TRADE IN PRECIOUS METALS AT SHANGHAI.

[From the Board of Trade Journal, London, October, 1894.]

Mr. N. R. O'Conor, Her Majesty's minister at Pekin, in a dispatch to the foreign office, dated July 23, incloses copy of a report drawn up by Mr. G. Jamieson of the import and export of silver and gold at Shanghai during the year 1893 and up to the end of June, 1894.

This report shows that the export of gold from China to foreign countries still continues and on an increased scale. There appears, it states, to be good reason for thinking that a considerable proportion of this gold is obtained from mining operations on the northern frontier, and if that is so, it is considered probable the supply will be kept up, or may even further increase.

The import of silver from foreign countries for the first time in recent years rises into respectable figures, viz, Haikwan taels 11,472,000 net, or about 15,000,000 ounces

Practically the whole of this silver comes in exchange for gold exported. The balance on the interchange of ordinary merchandise, taking one year with another, would allow of only a very small import of bullion. But assuming the supply of gold for export is maintained, then it may be anticipated that China will continue to be a consumer of silver to at least the extent of last year's figures.

The exports and imports for all China are not materially different from those given, which are the figures for the port of Shanghai alone.

The average value of the Haikwan tael in 1893 was 3s. 11¼d.

COLOMBIA.

No returns having been received of the output of the precious metals in Colombia in 1894, it is assumed in the table of the world's production in this report to have been the same as in 1893, i. e., 4,353 kilograms of gold, valued at $2,892,800, and 52,511 of silver, valued at $2,182,400.

GOLD AND SILVER PRODUCTION OF COLOMBIA.

[From the Annales des Mines.]

GOLD.

The production of gold in Colombia was, up to 1848—that is, until the discovery of the beds of California and Australia—the most important in the world, after that of Brazil, the approximate figures being, according to Soetbeer, 3,543,000,000 francs for Colombia against 3,559,000,000 for Brazil. If we carry the calculation up to 1893 we see that the gold product of Colombia exceeded that of Brazil (3,632,000,000 francs), and was surpassed only by the United States, the South African Republic, Russia, Australia, and India. This shows the importance of the auriferous beds of the country, which in 1891 produced 5,225 kilograms of gold; in 1892, 5,234 kilograms, worth 18,000,000 francs.

The gold industry of Colombia, however, is subject to certain legal restrictions, against which the miners protest vigorously, pointing out that the gold alone represents more than one-fifth of the total exports of Colombia. At present the mining companies can not utilize water courses for the washing of the alluvial deposits, except after they have first assured to the dwellers on the shores drinkable water, and if a single village enters a complaint charging a diminution in their water resources, an already organized industry may be compelled to suspend operations for the entire duration of the case at law, which it frequently takes a very long time to decide. In August, 1893, the Colombian Hydraulic Company, which produced more than 32,000 francs per month, was closed. A recent decree has somewhat attenuated this inconvenience. It is well known that in California conflicts of the same kind have arisen between the miners and farmers, but have been most frequently settled in the interest of the farmers. In California, however, the farmers had to complain not only of the insignificant loss of water, but also of the fact that enormous amounts of alluvions coming from the washings of the auriferous beds ruined the industry of agriculture, which was a very flourishing one.

As a matter of fact, more than three fourths of the gold extracted comes from the rivers and is worked by the natives of the country. The lodes which produce the remainder are, as a rule, in the hands of foreign companies, English for the most part, but sometimes French. Some French enterprises, especially on the alluvial beds of the Nechi River, have been in recent years rather unfortunate.

Of the nine departments into which Colombia is divided the only ones of importance in the production of gold are: Antioquia, Cauca, Tolima, and Panama. Those of Bolivar, Magdalena, Santander, Boyaca, and Cundimarca (that is, the entire east of the country) have but an insignificant product. The district of Antioquia (capital, Medellin) in the center of Colombia, supplies at present nearly two-thirds of the country's output of gold. More than 2,600 grants have been entered there. In 1858 the production of gold and auriferous silver was 7,800,000 francs; in 1882 it was 13,000,000, and in 1890, 14,560,000.

The number of miners working in the alluvial beds is more than three times that of the miners of lodes. There exist (running from north to south) gold lodes at Zaragoza, Amalfi, Remedios, Anori, Yarumal, Angustura, and Santa Rosa de los Osos, etc.; the auriferous alluvions occur mostly in the valleys of Pozoé and of the Nechi, north of Medellin. The French attempted, in 1887, to establish methodical dragging on the Nechi. The mines of Zaragoza, which were worked as far back as the seventeenth century, produced then about 500 kilograms per annum.

In 1890 the mines of Frontino and Bolivar, worked by the English, in this district, produced 76.5 kilograms of gold; in 1891, about 95; in the first six months of 1893, 1,363,000 francs of gold against 1,340,000 in the last six months of 1892.

In the district of Remedios the French company, of Segovia, works the mines of Cristales and San Nicolas. West of Medellin, the valley of Cauca, in which the city of Antioquia is situated, also possesses gold mines.

The department of Cauca (capital, Popayan), west of that of Antioquia, is considered still richer than it in gold, but the difficulty of reaching the beds, the frequent unhealthfulness of the climate, and the high price of labor have arrested the industrial development of the country. The principal mining districts are those of Choco, Barbacoas, and Supia. At Supia the mines of Marmato employed several thousand Indians before the Spanish conquest. The English reopened them in 1824. In the district of Choco alluvions have been worked from 1654 to 1851, the date of the abolition of slavery.

These alluvions form, according to the descriptions published in 1879 and 1883 by the English engineer, Mr. Robert White, Quaternary beds of a very irregular shape, occupying a space of 600 square miles in the valley of San Juan on the downstream of the Sipi, and are far from being exhausted (especially the strata of pudding stone neglected by the Spaniards as too hard to work).

The Choco district produced, from 1654 to 1890, gold worth 712,000,000 francs.

The Department of Tolima (capital, Neiva), situated in the southeast portion of Colombia, on the upper course of the Magdalena, the principal river of the country, although less celebrated in early days than the preceding, is the one in which the English and Americans have formed most companies latterly. The mines of Mariquita, in the northern part of the department, northwest of Bogota, were formerly the most celebrated; the Frias mine produces at present large quantities of silver. The departments of Panama and Darien, formerly produced much gold, especially at Santa Cruz de Cana. In 1853 a Frenchman, Mr. E. Lebreton, made an effort to reopen this mine. An attempt made in 1880 by an American company was unsuccessful. In 1887 Mr. Bonaparte Wyse also studied these beds. In 1877 an English company, the Darien Gold Mining Company, endeavored to work the mines in this region, but is not considered to have been successful.

SILVER.

The value of the silver extracted in Colombia since the Spanish conquest does not reach 6 per cent of that of gold. The reason is that up to the present day it was attempted to mine only such beds as are very easily worked—auriferous alluvions or croppings of very rich gold lodes.

It is only since 1873 that the production of silver began to increase. Owing especially to the mines of Marmato and Supia (Cauca) and of Mariquita (Tolima), the extraction reached, in 1884, 6,500,000 francs. After a decline, produced by the impoverishment of these mines, this figure was again attained in 1891 (31,232 kilograms). Among the silver mines which are best known and most prosperous, we may cite those of the district of Zancudo (Antioquia or Tolima) on the line projected from Medellin (capital of Antioquia) to Puerto Berrio, on the Magdalena.

The mines of El Cateador, Los Chorros, and El Zancudo, in this district, employ 820 men. A network of lodes is there worked which produce auriferous silver. The coal used comes from the neighboring regions of Titiribi Amaga, Fredonta, and especially of Sitoviejo, whose coal produces a good coke. During the two years 1888 and 1889, 18,500 tons of ore were extracted, producing 5,200,000 francs of gold and silver. The same company which works these mines has coal mines and metallurgical refineries, employing 530 men.

Until recent years the principal silver mines after those of Zancudo were those of the district of Marmato and of Supia (Cauca). In this region the auriferous silver ores of the Cerro de Loaiza and Chabuquia produced several millions of gold and silver between 1870 and 1890. They are now exhausted, but the Western Andes Mining Company is exploiting their prolongations (Echandia, Loarizita, and San Antonio). Recently the working of a rich auriferous silver mine at El Diamente (Antioquia) has been begun. The mines of Mariquita (Tolima) were discovered in 1551. There were then three principal lodes producing ore containing 3 to 4 kilograms of silver to the ton. In one of them, the Santa Ana, there were, it is said, ores containing from 1 to 2 per cent of silver. The series of attempts, however, made in 1826, 1846, and 1867 to reopen it was attended with no success.

The Frias mine, on the contrary, which reopened in 1871, produced in twelve years 1,600,000 ounces of silver, and in 1892 reaped a net profit of 2,700,000 francs on the extraction, representing 4,300,000 francs. This mine, which has been worked to the depth of 300 meters, is considered the principal not only of the department but of all Colombia. In 1893 it produced about 17 tons of concentrates per month, with a silver content of 300 ounces per ton.

In the Department of Darien the old mine of San Sebastian de la Plata (Espiritu Santo) has given rise to a great many legends. An attempt to reopen it in 1848 proved unsuccessful.

MINES AND MINING IN COLOMBIA.

[From the Transactions American Institute of Mining Engineers, Vol. XVIII.]

The principal mineral belt thus far discovered in Colombia is on the eastern slopes of the Central Cordillera in the departments of Tolima and Antioquia. The gold gravels of this belt have hitherto been more profitable than the metalliferous veins. Even in ancient times gold washing was pursued successfully, as is evidenced by the gold ornaments to-day dug from the "guachos" or ancient Indian graves. The larger part of the gold gravels of Tolima are in small, thin patches, which are intermittently worked by the natives by the "baréque" (a crude method of ground sluicing) and by the "batea," and afford in the aggregate a considerable amount of gold per year. The few larger gravels, of sufficient importance and value for persistent effort and work in the large way, are in the hands of foreign companies. As a rule it may be said that none of these gravels are more than 50 to 70 feet in thickness, that they are all troubled with pipeclay, and that their return per cubic yard is less than the gravels of California. It may also be stated that the working year is much curtailed by lack of water in the dry season and by the bursting of the ditches in the rainy seasons. Two successful English companies, the "Malpaso" and the "Oritá," on adjoining areas of gravel 75 feet thick, have been profitable. The "Malpaso" operates three monitors with 1,000 miner's inches of water, under a head of 125 feet, and pays monthly $15,000 to $20,000. The "Malpaso" is underlaid by 3 feet of rich cement. The "Oritá" operates two monitors with 800 miner's inches of water under a head of 100 feet, and pays monthly $5,000 to $7,000. Both properties are at times greatly troubled with pipeclay. An American company operates profitably at Charcas, on the Saldaña River, on gravels 60 feet thick, but lacks sufficient water. Other good gravels exist on the Saldaña River, but the obtaining of water in sufficient quantities and pressure will be difficult. A new English company is making a ditch 15 miles long, which will take 3,000 miner's inches of water from the river Guali under a head of 300 feet, to work the "La Rica" property, which has already been satisfactorily tested. An American company known as the "El Talento" owns the "Cájongra" and the "Boconá," in the same range as the "Malpaso" and "Oritá," but has as yet expended no money on the properties. Another American company, working the "El Campeon," was forced to close down on account of great thickness of pipeclay and very thin gravels, and an English company testing the gravels of "Pompona" did not find either sufficient gravels or water. It is not known that hydraulic properties are worked in Antioquia with water under pressure, but small spasmodic enterprises are abundant among the natives. Several foreign enterprises are reported in the Choco Valley and elsewhere in the Republic; but no notable results have been obtained.

The veins of Tolima are veins of quartz intercalated in the schists. These veins have a general tendency to wedge out and reappear in sympathy with the mobile curves of the schists. No true vein, cutting the formation, has as yet been found in Tolima. Thousands of veins of slight importance have been denounced in Tolima solely for the purpose of a possible foreign sale, although in a very few cases have even prospect holes been put upon them. As a rule they are of little value and very thin. A few gold mines have been worked at Ibague, Libano, and China by native companies without profitable results. The formation of mica schists offers the hope that more careful explorations will bring to light gold-bearing veins, cutting the formation, and of more assured length, depth, and value of ore. This is especially true of Anaime and Bermillion, and of a large unprospected area of mica schists west of Ibague. The native or Antioquian stamp mill costs very little, is operated by water, stamps 500 pounds per head in the twenty-four hours, has no mortar, and is rather inferior to the stamp mills figured by Agricola, in De Re Metallica, three centuries ago.

A number of silver mines are to-day worked in the belt of chlorito-siliceous schists, in which the ores, when produced, contain ruby and black silver. These ores can not be locally treated on account of the high price of salt. Hand picking and concentration are therefore resorted to, and transportation to America or England is necessary. Of these the Erias mine, owned by an English company, has been at times very productive, and to-day has ore on the 540-foot level. All the ore in this mine has been brought in by the intersection of a cross seam with a main vein. The ore is first hand picked up to 250 ounces, and all lower grades are concentrated on jigs and buddles to the same grade. All sortings and concentrations are shipped to England at a cost of $65 per ton, and are subject there to smelters' and agents' charges. It is estimated that the expenses of mining, concentrating, shipping, and reducing consume fully 100 to 125 ounces of any value per ton contained. The "El Cristo" mine is an American property, situated in the midst of and parallel to veins in the schist that are known to continually pinch out. It is not open to inspection. As yet but little ore has been produced or shipped by it, although it has been worked since 1885. The ore carries ruby and black silver. Two English ventures, denominated the "Calamonte" and the "Santa Maria," lie between the "Fria" mine and the "El Cristo" in the same schists. Although vigorously worked for several years, and extravagantly equipped with concentrating mills and compressed air drills, they have not as yet produced sufficient ore to justify hopes for the future, and their funds are almost exhausted. The same statement is true of the "Silencio" and "Organos" mines, at the head of the Saldaña River, both of them English enterprises. A new American mine has been opened at "Bocanéme," north of "El Cristo," which, by striking a considerable body of ruby silver ore of good grade at 180 feet in depth, excites very lively hopes for the future. The vein is located on the edge of the schist formation and near a dike of andesite, and may prove very profitable, but its ore will be subject to heavy charges for shipping to America.

Near the "El Cristo," in the same district and intercalated in the same schists, is the abandoned silver mine known as "Santa Ana," which has always been esteemed the greatest silver mine ever worked in Tolima. It was worked continuously from 1826 to 1878 by an English company, and when abandoned was 750 feet in depth. After fifty-two years of persistent work it was abandoned because its expenses had exceeded its receipts by more than $1,000,000, and during its history it had enjoyed but two short periods when it was worked at a profit.

These are all the vein mines worked in Tolima in 1888 that are worthy of record here, on account of the effort and intelligence applied to them.

The enterprises in mining in Antioquia have also been very few indeed and a very uncertain product. The most profitable mine worked in Antioquia is said to be the "Zancudo," of which most extravagant stories are told without authenticated details. Very few mines are worked in Cauca and other parts of the Republic, but the number of unprospected mining claims is very great.

As yet no gold or silver veins of marked value and product, as judged by North American standards, have been discovered in Colombia, and very few foreign investments have been remunerative. The history of the Santa Ana mine excites distrust of veins included in the schist in this locality. The best chance for the mining industry of Tolima, and perhaps of all Colombia, depends on the discovery of gold and silver veins, cutting the schist formation and not included in it, and especially of veins near the eruptive rocks breaking through the schists.

A very large annual gold product has always been claimed for the Republic of Colombia, without any authentic figures being given to sustain the claim. It is not impossible that as much as $2,000,000 annually may be produced, mainly coming from very small enterprises in ground sluicing thin patches of gravel of slight area. Much territory in Colombia still remains to be explored, undoubtedly, and valuable mines may be actually discovered; but the Republic of Colombia does not to-day offer an attractive, profitable, or safe field for foreign investment, and statements as to rich mines in that country should be received with more than ordinary caution.

ECUADOR.

The gold product of Ecuador in 1894 was 103 kilograms, fine, of the value of $68,454.

Ecuador produced no silver in 1894.

GOLD DEPOSITS OF ECUADOR AND COLOMBIA.

[T. Waln-Morgan Draper in Engineering and Mining Journal.]

That portion of the west coast of South America within the confines of the Republics of Colombia and Ecuador is but little known to the world at large. From Panama south as far as Esmeraldas, in Ecuador, there are numerous deposits of gold, usually in gravel, but it is impossible to definitely state their extent or sources. Vague rumors of great "mother" veins in the main ranges, said to have been worked by the Incas and now jealously hidden by the natives, are frequently heard. Expeditions have been undertaken many times to find these old mines, but the errand has always been a fruitless one. The Spanish conquerors are held responsible for mysterious workings, from which great stores of gold were drawn, and old grants by Charles V, the actual title deeds of which are exhibited as proof of the gold to be found, may be seen.

That the Incas at the date of Pizarro's conquest possessed great store of gold is undoubtedly true, yet one must not forget that this gold was most probably the accumulation of ages. When the miserable natives had been robbed and tortured out of all their visible wealth they were enslaved by the Spaniards and made to mine for more, and it is a matter of history that the results were so meager that the conquerors believed the Indians were hiding the most valuable sources of their wealth. One property, a Charles V grant with a musty title deed, was worked extensively for those times by the Spaniards with numerous slaves for over one hundred years, and a careful examination and measurement of the work accomplished shows that half a dozen 4-inch "giants" would do as much in one year's time. The gravel is rich, and careful hydraulicking would obtain an average of 40 cents to the cubic yard, but no such results were obtained by the Spaniards with their tiny reservoirs, which, when filled with rain water, were turned loose to wash the gravel down a rock sluice.

There are places in the mysterious region known as the "Interior," on the eastern slope of the Andes, where much gold exists. This statement is made on the faith of the late English minister to Ecuador, who resided at Quito many years and made careful study of the resources of the country to the east. He had never been there, but he states that a constant flow of gold comes in from that section, brought by the Indians, and so great is the amount that valuable deposits must exist. This land of gold is, however, not to be entered. No white man has ever returned alive. The savages are fierce and brave and are known to practice cannibalism.

On the west coast the country is a trackless wilderness. It has no railroads, excepting 23 miles of narrow-gauge from Buenaventura headed for the interior, and 56 miles from Guyaquil, also headed for the interior. Then there are in Colombia and Ecuador no wagon roads, and paths and trails are of frequent occurrence. Nature has, however, provided communication from the coast inland by waterways. The many rivers, with their numerous tributaries, the inlets, arms, and sounds of the sea offer means of travel and transportation, and for the present are adequate.

The most important of the towns along the coast are Buenaventura and Tumaco, in Colombia, and Esmeraldas and Bahir, in Ecuador. These villages are the distributing and receiving points of a vast and sparsely settled country. Here come the canoes from the inland, each bearing its little burden of coffee, cocoa, plantains, ivory, nuts, and fruits, and usually, carefully wrapped in a leaf, a little gold dust, or a nugget or two, or perhaps some ancient golden ornament, discovered by chance, all to be disposed of to the local merchants. The gold is in all kinds of shapes, and thus flows in tiny streams to the coast, where it is bottled and boxed by the merchants and shipped away in payment of goods. One collection, which was sent to Italy in payment for a consignment, was the accumulation of three months' trade and exchange. There were nuggets, leaf, flower, and fine gold, mixed with several plain nose rings and a number of golden fishhooks. The natives, both men and women, are experts with the wooden "batea," and know no other way of getting the gold out of the stream.

The general character of the coast line is usually that of a vast delta, and it is necessary to proceed several miles inland before any solid ground is reached. After proceeding well upstream for twenty-odd miles or so to the larger tributaries one reaches the beginning of the gravel deposits. It must be borne in mind that the rivers of the west coast are short in length and precipitous in fall, the reason being that the main Andean range is quite close to the Pacific, and in it these rivers take their rise, as do also many rivers of the east coast, which are of very great length. From one point on the Pacific in Colombia it is but a four days' journey to a tributary on the Amazon, and one may launch a canoe at this point and float to the Atlantic Ocean.

Navigation by canoes is the only method of reaching the mines on the upper tributaries, and as rapids, currents, and whirlpools are soon met with, this is full of difficulties. Only the wonderful skill and endurance of the natives in working and managing their canoes renders it possible to transport goods and machinery, all of which must be reduced in size and weight and carefully protected against wetting. Transportation by canoe is most expensive; the canoeman knows he is indispensable and charges accordingly. On some of the larger rivers a few flat-bottomed, very light-draft steamboats are run for short distances, and this style of navigation is bound to increase if the mines are worked.

There is nowhere a lack of water for hydraulic mining. In fact, one might almost operate with the rainfall, if gathered and stored in reservoirs. So great is this, caused, doubtless, by the immediate neighborhood of the Andes and the dense forests covering the whole country, that it is a source of constant and vexatious delay in preparatory work and renders the country most unhealthy; yet, if it were not for it one could not well live, as the nearness of the equator at this low altitude would make the heat unbearable if the sun were to shine for any length of time. As a matter of fact, it rarely does shine more than once a week, and then only in a fitful manner for a few hours. From careful observations, reaching over a period of three months, at 6 a. m., 12 m., and 6 p. m. it was found that the average temperature was 77° F. (maximum, 84° F.; minimum, 71° F.). The humidity was very high in the morning, lowest at noon, after which it gradually rose during the afternoon and night.

The highest point observed was 97°; 94° was not unusual at 6 a. m. The lowest point was 56°. The observations were taken by means of a hygroscope and also a hygrometer. During the period of observations the "little summer" period, or so-called dry season, was experienced, during which it only rained during the night, and for the whole dry season of five weeks there were but three perfectly dry twenty-four hours. At this period the water courses are at their lowest, but they are so numerous that there was no lack of water. As a matter of safety, however, natural storage by the damming of adjacent valleys would be wise and inexpensive, especially as the natives state that there occur every few years long periods of drought when no rain falls. Another reason for extensive storage of water is that the surface of the country is a yellow clay beneath a very slight covering of loam, which is not permeated by water, therefore shedding the rain immediately it falls. Few springs are found, and the rains are really the only sources of the streams. This clay, although hard to work, is excellent for ditches and of sufficient depth everywhere. This clay not only sheds water, but is very seldom penetrated by roots. The tremendous rainfall causes freshets, which effectually clean the streams and remove all tailings dumped into them from the sluices. It is difficult to give an accurate estimate of the rainfall, as it differs very much in the gold zone, but judging from observations made in Ecuador, it is probable that 220 inches per annum is not far from correct. This excessive fall of rain will be materially modified as the forests and jungle are cleared away, and a wise foresight will provide in the beginning for this eventuality.

The character of the country is eruptive and volcanic, covered by an almost impenetrable forest and jungle in which are vast quantities of valuable woods for all purposes. The great mountain, Cotopaxi, rises behind and denominates the country. Extending north and south are vast lines of magnificent mountains. There are numerous places along the coast where great streams of lava have been kept back by the sea, into which the molten streams poured. One most remarkable flow, for depth and breadth, is to be observed across the bay from Panama, near the veins of that older city destroyed by the buccaneers. Examples of the most tremendous volcanic action are to be found everywhere from the mountains to the sea, not alone of lava, but of vast flows of conglomerate, the consistency of which and the direction of flow clearly indicate its origin. Yet a most curious marine formation of shells in sandstone is found far from the sea lying on the conglomerate deposits.

The fundamental rock, the original base or bedrock, on which all else rests is porphyry of a very semicrystalline type. It is but rarely found cropping to the surface. In the gold placer zone the base is covered by a very hard conglomerate or pudding stone, purplish as to general color, containing pieces of rock of all kinds, shapes, and colors, rarely of greater dimensions than 12 inches square. One peculiarity noted is that quartz is rarely present and is seldom found in the gravels. On this conglomerate the gravels have been deposited in layers of various depths and at different periods.

The gravels are of many kinds, colors, and degrees of richness, there being apparently no rule by which one may judge as to value. In one case the lower schist is lean, and in another it is very rich. Some of the banks of gravel are easy to work, and the clay has little consistency, but the largest deposits with the highest banks and richest in gold values will be more difficult to wash, the bluish-purple clay having the tenacity of putty, requiring long lines of sluices and very careful work.

The only other metals that occur are platina, called "Juan Blanca" or "White John" by the natives, and considered by them to be of little or no value, and a slight trace of silver. All the gravels contain large quantities of arsenical pyrites in well-defined crystals. Underlying the gravels proper in some instances is a body of cement gravel exceedingly hard and usually red or brown in color. Careful examination of the conglomerate and cement gravel showed no gold.

One may sum up the placer zone very briefly, as follows:

There are great deposits of rich gravel in banks so situated that they may be economically operated upon, with plenty of water, high dumps, abundant timber, and swift streams to carry away the tailings. The water supply is carefully studied and provided for and is all that could be desired. As against these, the whole region is unhealthy. It is expensive to operate in, especially for transportation. The natives are of little use as laborers, especially the Serranos, or natives of the interior, and either West India negroes or Chinese should be employed for any extensive work. Food supply for the whites must be brought from distant points. To meet all these difficulties in a new country requires a liberal supply of money, time, and patience, three things that the officers and stockholders of mining companies rarely comprehend.

FRANCE.

France produced gold from its own mines in 1893 of the weight of 300 kilograms and the value of 960,000 francs, or $185,280.

The product of 1894 is assumed to be the same as in 1893.

The production of silver in France in 1893 was 98,077 kilograms, of the commercial value of 12,750,000 francs. The United States coining value of this silver product was $4,076,080.

The silver product of 1894 is assumed to be the same as in 1893.

GERMANY.

Germany's production of gold in 1894, from both foreign and domestic ores, was 4,133.46 kilograms, fine.

Its production of silver in 1894, from both foreign and domestic ores, was 444,213.39 kilograms.

In the replies received to the interrogatories of this Bureau for 1894 no separation has been made of the metal obtained from foreign ores from that extracted from domestic ores.

Germany's output of the precious metals from domestic ores in 1894 is, therefore, assumed to have been the same as in 1893.

GREAT BRITAIN.

The gold product of Great Britain in 1894 was valued at £13,573, or $66,100, corresponding to 99.39 kilograms, fine; and that of silver at £33,313, representing, at the average price per ounce standard of 29 pence during the year, 7,932 kilograms, fine, of the coining value of $329,700; at which figures the gold and silver output of Great Britain in the calendar year 1894 appear in the table of the world's production of gold and silver in this report.

GREECE.

Greece produces no gold.

The amount of silver produced in 1894 is estimated at 35,436.7 kilograms, fine.

In explanation of these figures, we here quote from Mr. E. Alexander, United States minister to Greece:

> The Laurium mines produce an argentiferous lead from which the silver is separated in the refineries of Western Europe. The amount of this argentiferous lead exported in 1894 (all of which, however, was probably not mined during that year) was 16,200 tons. The amount of silver contained in each ton of ore was, during the

first six months, 2,375 grams, and during the last six months, 2,486 grams, an average of 2,430.5 grams. The amount of silver produced from the ore exported may, therefore, be estimated at 39,374.1 kilograms. Assuming this silver to be .900 fine, the fine weight was 35,436.7 kilograms, and the coining value $1,472,749.25.

THE SILVER MINES OF MILO.

[Mr. L Delauney, mining engineer, in the Annales des Mines, October, 1894.]

The silver mines of Milo are intimately associated with barytines which are slightly argentiferous, and inclosed in trachyte or liparite. The eruptive rock contains either *mouches*, or leadings of quartz, barytine, galena, iron pyrites, chalcopyrites, and blende, of weak tenor in silver and unworkable; in the interior of the eruptive rock there are argilacious pockets which seem to result from the superficial decomposition of the rock and from the corresponding concentration of the metalliferous elements disseminated through it. These argilacious pockets are impregnated with barytine and are rich in silver mineral ores. They are, properly speaking, real silver beds. In them are found, as in the croppings of the American veins or lodes, traces of chloride of silver, but the greater part of the silver is found in a state of sulphide mixed with barytine.

These pockets, therefore, are constituted of argentiferous clay between liparite, greatly decomposed, and granular or compact barytine. Some of these masses of grey or blackish argil are as much as 12 meters, or 39.37 feet, in width; but considering their mode of formation they must be essentially limited in depth, and it is probable that lower down only sulphides of lead and zinc, more or less argentiferous, will be found in the intact rock. According to the very probable theory of Mr. Dambergis, we would have here to do with products caused by the alteration of lodes and impregnations of argentiferous galena with barytine which had under chlorureting influences produced chloride of lead which is carried away by the waters, while the sulphide of silver, which is partially transformed into chloride, remains concentrated in the argilacious and barytic residue of the rock.

Being given the feeble dimensions of the island (20 kilometers, or 12.43 miles, in length by 10 kilometers, or 6.21 miles, in width), it is likely that all these beds are part of one same stratified formation of recent origin, which had given rise to several lodes running northeast by southwest.

Their discovery was made about ten years ago. Beginning with 1880, however, the Iron Mining Company of Siphnos and Eubœa had taken a grant of argentiferous galena on the west zone at Galana.

In 1884 there was discovered in the neighborhood of the grant (at Triades) silver ores, of which, under the direction of Mr. Serpieri, there were extracted up to 1890 about 20,000 tons.

About 1886 the silver ores of Cape Vani were discovered in the northeastern part of the island; those of Pilonisi and Mount Mirovilia, on the eastern coast, and those of the island of Kimolos, in the northeastern part of the island. After these discoveries were made the Greek Government voted a sum of 100,000 drachmas to be expended in the study and estimation of the value of the beds, a study which was made by a German engineer, Mr. Alex. Gobantz, and which gave, according to him, very favorable results. It is proper, however, to remark that the ores are most frequently poor, and always show a silver contents of extreme irregularity, a fact which could not fail to render the estimates which are reproduced here of a very hypothetical nature.

We shall now describe the various beds:

At Triades Mr. Gobantz estimated the quantity of argentiferous barytes at 750,000 tons, that of the argentiferous argils and liparites at 1,440,000 tons, the silver contents varying from 350 grams (5,401 grains) to 1 kilogram (15,432 grains) per ton. The mass of blackish argils, from 8 to 12 meters in thickness (26.25 to 39.37 feet) are very irregular, and are intercalated between the liparite and the barytine.

Some silver is found in the liparite and barytine larger quantities are found in the argil. It occurs in the form of sulphide so finely disseminated that it can not be seen with the naked eye; the contents are very variable and generally small, but there are pockets in which its contents may reach 10 kilograms.

The work of exploration is confined to five galleries, from 8 to 30 meters (26.25 to 98.42 feet) in length, and to five shafts, the deepest of which is 22 meters (72.18 feet).

The bed of Cape Vani is found in intimate relation with manganese ores, which have been exploited by Mr. Serpieri. The cubic contents is estimated at 1,250,000 tons, one part of which holds from 200 to 240 grams (6.43 to 7.71 ounces) of silver to the ton. Above the manganese ores (Miocenes, as we shall see) there exists an almost horizontal bed of barytine, partly compact and partly saccharoid, containing 200 grams (6.43 ounces) of silver to the ton. Liparite is found under the manganese.

At Mount Mirovilia there has been developed by six galleries of the total length of 120 meters (393.7 feet) a continuous lode of argentiferous argil and barytine with a cubic contents of 2,500,000 tons.

Lastly, the lodes of Pilonisi are prolonged across the sea toward the islands of Kimolos and Polonos. Their cubic contents is estimated at 3,374,000 tons, with very variable quantities of silver, reaching in some places to 2 kilograms to the ton. As a general rule, in all these beds the silver contents is on an average rather small, and extremely variable and sporadic, sometimes going from a few grams to 1 kilogram in an area of a few meters. The distinction of the rich and poor ores seems rather difficult to make without an analysis by the dry method, a thing which would make sorting very difficult. However, the 10,000,000 tons, with an average contents of 500 grams or a total of 5,000,000 kilograms of silver, which have been supposed to exist at Milo, explain the enthusiasm which these discoveries excited in Greece.

We here give some analyses made at Greek Laurium, which according to Mr. Cordella, represent lots of from 4,000 to 8,000 kilograms:

(1) Hard trachyte, containing leadings and impregnations of galena, pyrites, chalcopyrites, yellowish blende, and reddish quartz; some crystals of barytine were isolated in the mass.

$BaOSO_3$	25.80	Zn	3.50	Mn	.33
Pb	.87	Fe	2.58	SiO^2	.55
Ag	.0089	As	.039	$AlO^{2}3$	3.4
Au	.0001	Sb	.39	MgO	.57
Cu	.638	S	2.21	CaO	1.80

The crystals of barytine, separated from the mass, contain 30 to 50 grams of silver to the ton; the isolated galena, 1.451 grams of silver. This rock is not utilizable.

(2) Yellowish argil with barytine. This argil seems to result from the alteration of the trachyte rock. It contains, besides argentic sulphides, small fissures, filled with crystallized galena, with barytine gangue, or with pyrites, chalcopyrites and blende.

$BaOSO_3$	70.78	Fe	3.26	Al^2O3	7.2
Pb	.15	Mn	.25	MgO	.68
Ag	.045	As	.07	CaO	.80
Au	.0001	Sb	.14	Cl	.123
Cu	.21	S	1.7		
Zn	1.90	SiO_2	.96		

An assay has shown that of 445 grams of silver contained in the ton, 300, or 67½ per cent, may be extracted.

(3) Grayish argil, intimately mixed with barytine, containing galena, iron pyrites, and yellow blende:

$BaOSO_3$	76.40	Fe	1.89	Al^2O^3	6.30
Pb	.15	Mn	.37	MgO	.36
Ag	.0285	As	.05	CaO	1.90
Au	.0001	Sb	.41	Cl	.07
Cu	.15	S	2.20		
Zn	2.10	SiO^2	6.20		

An assay has shown that of 285 grams of silver, 162, or 57 per cent, may be extracted; the galena extracted from the argil contains 725 grams (23.31 ounces) of silver to the ton of galena, or 929 grams to the ton of lead.

According to Mr. Dambergis, there are in Milo four classes of ore, the richest of which contains 10 per cent of lead and 900 to 1,000 grams (28.93 to 32.15 ounces) of silver; the others, on an average, contain 1 per cent of lead and 500 grams (16.07 ounces) of silver. The output in industrial silver would be, for the ores containing 300 grams, 60 per cent of silver; for those containing 400 to 700 grams (12.86 to 22.5 ounces), 70 per cent, and for those containing 1,000 grams, 85 per cent. Certain minerals contain johnstonite (galena with an excess of sulphur). As a method of treatment, an endeavor has been made at Greek Laurium to pass the ores of Milo through a glazing furnace together with plumbiferous ores.

These ores had in this case the advantage of carrying, besides silver, a certain proportion of silicium necessary for the fusion of the ores of Laurium, which are basic and ferrous.

The treatment by the wet method (chloruretting, roasting, lixiviation, and precipitation by copper) is equally applicable. Attempts at previous enrichment did not produce advantageous results. Mr. Cordella gives as the valuation of the ores based on the following tariff of Saxony and the Harz, silver being valued at 125 francs per kilogram:

300 grams or 0.03 per 100 = 3.95 per ton.
400 grams or 0.04 per 100 = 9.75 per ton.
500 grams or 0.05 per 100 = 18.00 per ton.
600 grams or 0.06 per 100 = 26.40 per ton.
700 grams or 0.07 per 100 = 34.80 per ton.
1,000 grams or 0.10 per 100 = 63.00 per ton.
2,000 grams or 0.20 per 100 = 170.00 per ton.

The conclusion from these figures is, according to Mr. Cordella, that all ores containing below 600 grams to the ton are unsalable to European refineries, and can be utilized only on the spot by the wet method. He estimates the cost as follows:

	Drachmas.
Extraction	3.00
Labor	1.50
General expenses	1.00
Cost of charging	.50
Cost of exporting by sea	5.00
Total	11.00

or, by taking into account the actual profit by exchange, about 8 francs. The expenses of treatment by the wet method on the spot would carry these figures to a minimum of 20 francs.

THE GUIANAS.

BRITISH GUIANA.

Mr. James Spaight, vice-consul of the United States at Demerara, has forwarded through the Department of State, the following report made by Mr. E. P. Wood, commissioner of mines, on the production of gold in British Guiana, placing the product of that colony at about 138,529 ounces, or 4,308 kilograms, of crude gold. The crude gold of British Guiana is valued at $18 per ounce, which gives the total product a value of $2,493,522, corresponding to 3,752 kilograms, fine, at which figure it appears in the table of the world's production of the precious metals in this report.

GOLD MINING IN BRITISH GUIANA.

[By Mr. E. P. Wood, Commissioner of Mines.]

Climate.—The climate is something like northern Queensland, too hot to do hard manual work, but not too hot to prospect and to superintend the work afterwards. The heat in the shade is seldom more than 90°, though it is a very exhausting heat, and equal, in my opinion, to 120° in some other countries. There are supposed to be two wet seasons in the year, about Christmas and midsummer, for two months each. The rainfall may be taken at about 110 inches a year.

Mode of working and labor.—Where the gold is being found in British Guiana is up the different rivers, at a distance of from 100 to 300 miles from Georgetown. The richest district is the Potaro River district, a branch of the Essequebo. Then there is the northwest district, the Cuyuni, Mazaruni, and Demerara rivers, in all of which gold is being obtained. The return from these districts during the last twelve months for placer washing was:

District.	Quantity.		
	Oz.	*dwt.*	*gr.*
Essequebo	72,787	7	10
Northwest district	31,837	17	11
Cuyuni	24,978	0	1
Mazaruni	9,418	17	2
Demerara	5	14	14
Total	139.027	16	14

It is all forest land, very dense, and as no roads have been formed the way of getting to the different places is by boat, the rivers all being navigable for a great distance inland. People intending gold digging either buy or hire (the former generally) a boat sufficiently large to carry, say, twelve or fourteen men and three months' provisions. They then engage and register a certain number of laborers. There are steamers leaving once a week for the northwest district and every day for Bartica, a settlement at the junction of the three rivers, Cuyuni, Mazaruni, and Essequebo. There you have to take to your boat and paddle to your destination.

Requirements.—All food, tools, etc., can be obtained in Georgetown at reasonable rates. Boats can be made at a cost of about £25 ($121.65). A laborer's wage is 2s. 8d. (65 cents) per diem and his food, the cost of which is about 10d. (20 cents) a day.

Royalty and licenses.—The royalty on all gold obtained in the colony is 3s. 9d. (91 cents) per ounce, which has to be paid into the colonial treasury in Georgetown before the gold can be sold.

A prospecting license costs 2s. 1d. (50 cents) per month; for every grant of a mining claim 8s. 4d. ($2.03) a month, and for every grant of a placer claim 4s. 2d. ($1) a month.

Alluvial working.—The size of each claim is 1,500 by 500 feet, and as a rule the depth of stripping is about 4 feet and the wash about 2 feet. It is all heavily timbered. Water is fairly plentiful, but has very little fall, and in a good many claims Californian pumps or Spear pumps might be used advantageously, instead of bailing with buckets, as at present.

Reef claims are not being worked at present, only one company erecting machinery. The quartz is very rich, many surface samples assaying 50 ounces to the ton, and though these may have been fancy pieces, yet, even where there is no visible gold, they often give 8 to 10 ounces. So little work has been done on the reefs that it is quite out of the question to give much of an account of them. They are of all sorts and sizes, quartz very friable, and, as far as I have seen, not cased quite as one would wish, but still there has been so little done as yet that one can not form a very correct judgment on their permanency. Everything would point to there being an exceedingly rich reefing district, and the chief thing needed is a class of men that understand mining. The laborers will have to be educated up to underground work, but there is no reason why they should not make good miners eventually.

Timber for mining purposes grows in plenty on every claim, and each claim holder is entitled to cut what he requires free. If more is required a wood-cutting grant can be obtained at a small rental. At present there are very few white men working; nearly all the parties are composed of blacks, financed by storekeepers and others in town.

This mode of working must very shortly collapse, as the gold in many cases does not find its way to the real owners, and it is only a spirit of gambling that keeps the thing up. No doubt eventually the laborers will form themselves into parties and work for themselves, but they are such an improvident lot that they scarcely ever save money enough to fit themselves out with even clothing before they leave for the mines. Another thing, they will not trust each other; but this might be got over by dividing the gold each night.

Answers to correspondents.—The amount of gold produced last year was 138,527 ounces, and the year before 134,124 ounces.

The laborers are African blacks, the descendants of the slaves of former years.

The only geological survey is a book called Reports on the Geology of British Guiana, by Charles B. Brown, F. G. S., and J. G. Sawkins, printed and sold by Longmans, Green & Co., London.

The best time of the year to arrive in British Guiana is about October, but, with the exception of July, August, and September, there is very little difference in the climate all the year round.

Flooded rivers do not stop the boats going up except on very rare occasions.

Diamonds.—Several diamonds have been found by chance in panning off the gold at the end of a day's work, and if found like this any old diamond miner would say they must be in pretty large quantities. I have no doubt that if a small pulsating machine were tried diamond mining would pay.

In sluicing there is but little chance of a diamond stopping in the box, and still less chance of its being discovered in panning off. Many of the laborers employed have never in their lives seen a diamond in its natural state, and are only attracted by the peculiarity of its shape.

STATEMENT SHOWING AMOUNT OF GOLD OBTAINED IN THE COLONY.

Year.	Quantity.		
	Oz.	*dwt.*	*gr.*
1884	250	0	0
1885	939	0	0
1886	6,518	1	12
1887	10,986	14	0
1888-89	20,216	1	8
1889-90	32,332	16	5
1890-91	66,864	4	21
1891-92	110,555	12	5
1892-93	134,124	7	23
1893-94	137,527	16	14

The following is by Louis S. Delaplaine, United States consul at Demerara:

THE GOLD FIELDS OF BRITISH GUIANA.

Of late years considerable attention has been drawn to the mineral wealth of British Guiana, and especially to the mining of gold, which was first undertaken on a small scale in the year 1883, and which has developed until the mining industry in the colony is second only to that of growing sugar cane.

In the year 1884 there were produced 250 ounces of gold, valued at £1,020. Each successive year has noted an increase in the output, and it is estimated that the value of the gold produced in the fiscal year 1892-93 will be not less than £700,000. Gold seems to abound in more or less paying quantities in all sections in the interior of the colony; but, owing to the heavy undergrowth, or bush, as it is locally termed, the entire country is inaccessible, and, up to the present time, incapable of development, excepting only those portions which can be reached in open boats on the various rivers and tributary streams. Sooner or later the interior will be developed, the brush cleared away, and it is safe to assume that the world will have a new gold field of very great importance. Considerable quartz has been found in several places, but at present there is only one quartz mill in operation, although a great many placer claims are being worked. Another company has ordered a 40-stamp mill, which will soon be in operation, and it is claimed that there is enough exposed quartz now at hand to keep the mill busy for at least a year. The ore is not so rich as that of California and elsewhere, and there is no question of the fact that there has been considerably more money sunk into the ground here than has ever been taken out of it. However, this is probably due to local conditions, such as the lack of experienced men, the difficulty and expense of transportation of labor and provisions to and from the base of supplies, and, most important of all, the inferior quality of labor which can be commanded.

LABOR.

There is no white labor to be had here, and the negroes who perform the manual part of the work are about as worthless and lazy as can be imagined, not to speak of their moral and mental deficiencies, which are matters of no slight importance. The colonial government has enacted a series of mining regulations with the evident intention of protecting both capital and labor. The laborers on signing their contracts are regularly indentured for a period of three months; their pay is 64 cents per day per man and keep. An advance of $6 per man is allowed on signing contracts, which contracts are approved and recorded by the gold commissioner. The trouble is to get a negro laborer to live up to his contract, and desertions are serious matters when the remoteness of the mines is considered. There is a penalty of confinement in jail for such desertions, but it seems inadequate, for the reason that a Demerara negro would just as soon be in jail as out of it, so long as he has enough food to fill his stomach. The cost of labor—64 cents per day—seems very low, but when its quality is considered it is conceded that the remuneration is ample.

LOCATION AND ACCESSIBILITY OF THE GOLD FIELDS.

There are five separate and distinct fields in the colony, each of which is more or less difficult to reach on account of the very primitive methods of transportation.

There are no railroads penetrating the interior, although there is considerable talk, as there has been for years, of building one; and, strange to say, there is not even a dirt road or footpath for the use of either man or beast. The only way to reach the gold fields is by open boat propelled along the rivers by native Indians. The fall of the rivers is very steep, and there are numerous falls and cataracts to be passed, which make the journey laborious and expensive, and also very unpleasant with the hot sun continually beating down on the traveler's head. Provisions and supplies of all kinds must be transported in the same way. This, with the number of men one must employ, makes mining in British Guiana an expensive undertaking. As an instance of the inaccessibility of the various fields, it may be mentioned that certain districts less than 100 miles from the city of Georgetown are three weeks distant in time.

MINING REGULATIONS.

In addition to the regulations applying to labor, the colonial government has passed other laws, chiefly with an eye to its own financial benefit. The most important of these is the government tax, or royalty, of 90 cents per ounce on all raw gold produced. Out of this tax has grown an evil which is bitterly complained of by all mine operators, especially Americans. This is the searching of the person and effects of all those coming down from the diggings, in order that no gold may be smuggled. It is an open question whether or not this searching is legal, but so far no proper test of it has been made in the courts. It is doubtful, even if the test were made, that a just decision would be given, as the average Demerara magistrate is remarkable principally for his ignorance of law. As an instance of how this searching is done, and also to give an example of Demerara justice, I will cite a case of an American miner who recently came down the Barima River with some twenty of his negro laborers. When the party reached the searching station they were huddled together in one common group, manager and blacks together, and, with the exception of the manager, searched. When his turn came he stated that, while he would not object to being searched, he would refuse to have it done in public, with his clothing removed and person exposed to the view of all. As a result of this action he was summoned before a magistrate and fined $125 and costs, amounting in all to about $160. In order to prospect in this colony, one must procure a license therefor, which costs $6 per year. There are also small fees for registering laborers, etc. Another great cause for discontent with the mining laws arises from the fact that no title or patent can be got outright for mining claims, the same being given only provisionally. The government requires that a certain amount of work must be done annually upon such claims, and for the breach thereof the property reverts to the government, no matter how much labor or money may have been previously expended on it.

NEED OF PRACTICAL MEN.

One great drawback to the development of the gold fields, and the chief reason why so much money has been unnecessarily squandered therein, is that there is no native of this colony who has the slightest idea of the proper way to develop and operate a mining property. Unfortunately, moreover, the majority of miners who have been secured from other places are totally incompetent for the performance of their duties. There are men managing valuable mining properties here who do not possess the qualifications properly to conduct the operations of a coal mine. The few practical men here at present are, with hardly an exception, Americans.

CLIMATE AND HEALTH.

Notwithstanding representations to the contrary which may be made by interested parties, the climate of British Guiana is bad. This statement is forcibly borne out by the official mortality statistics, which show the death rate to exceed the birth rate in a ratio of about 2 to 1. The climate is bad enough in Georgetown (Demerara) and along the seaboard, but it is infinitely worse in the interior. There has been no yellow fever in epidemic form in the colony for several years. At the same time other fevers of all kinds abound; also malaria, ague, rheumatism, and a variety of ailments native to any section which is low, flat, and swampy and which is at the same time hot.

All persons coming from a northern climate should be most careful of their health while in British Guiana. When one becomes sick here it does not take long to have the case decided. In a few hours the patient either has recovered or is dead. It is important in this climate that one should be very abstemious in the use of liquors, the abuse of which frequently results fatally. This applies especially to miners or those whose business takes them into the interior. Another thing to guard against is the wearing of wet clothing, which will bring on fever. As it rains incessantly here for months at a time, this is a hard thing for a miner to do, in view of the fact that his duties naturally subject him to exposure.

In summing up this report it may be well to mention that it is the intention of the writer neither to persuade American citizens to come here and try the gold fields nor to dissuade them therefrom. The facts herein contained are reliable, and were furnished by the best authorities. There is plenty of gold here, and the only difficulty is to get to it, only an insignificant portion of the gold territory having been explored, much less located. I should give it as my opinion, based upon the testimony of practical experts familiar with the field, that a miner who is thoroughly acquainted with his business and has a moderate amount of capital to back him up (say not less than $2,500) can come here with reasonably fair prospects of success. I should strongly advise against the coming of all those who do not possess the following five qualifications: (1) A thorough and complete knowledge of mining; (2) a moderate capital to equip his party; (3) a good, sound constitution, without organic disease; (4) the willingness to indulge very moderately, if at all, in the use of alcoholic or malt stimulants; (5) the ability to properly command and direct labor drawn from the very lowest classes.

GOLD AND DIAMOND MINING IN BRITISH GUIANA.

[From the London Mining World, March 2, 1895.]

Attention has not lately been called to the unquestionable value of the gold and diamond deposits of British Guiana, South America. A report on this subject has recently been prepared by Mr. John H. A. Powell for the British Guiana Gold Fields, Limited, of Broad Street avenue, and is full of interesting matter. We are told the precise situation of British Guiana, and that it has an estimated area of 110,000 square miles. It is, in fact, the only portion of South America owned by Great Britain. Its chief center is Georgetown, at the mouth of the Demerara River, which can be entered by the largest ships, and the Royal Mail Steam Packet Company run a regular fortnightly service from Southampton to Georgetown. The population is under 300,000, and the climate is fairly good. Englishmen who live temperately do not suffer from it. The mining laws have been consolidated, and communication with the gold fields is by means of the numerous waterways which intersect the colonies in all directions. Active steps are, however, being taken to open up the country by means of railways and roads, and the labor supply is good. The transport charges do not appear to be unreasonable, and water and fuel are abundant all over the colony.

These are the returns of gold as taken from the report of the commissioner of mines for 1893:

Year.	Gold.			Year.	Gold.		
	Oz.	*dwt.*	*gr.*		*Oz.*	*dwt.*	*gr.*
1884	250	0	0	1889–90	32,332	16	5
1885	939	0	0	1890–91	66,864	4	21
1886	6,518	1	12	1891–92	110,555	12	5
1887	10,986	14	0	1892–93	134,124	7	23
1888–89	20,216	1	8				

The distribution of the precious metal is wide, but the principal quantity in 1892–93 nearly £50,000, came from Essequebo. The whole of this gold was obtained from alluvial washings, quartz mining having been totally neglected until last year. Mr. Powell has examined many of the recently discovered reefs, and has never seen richer outcrops. The reefs are, however, very little developed, but they are of sufficient promise to have led to the formation of local syndicates, one of which is erecting a 20-stamp mill, which will soon be at work. Assays obtained of various ores from British Guiana by Messrs. Pixley and Abel have given very wide results, not lower than 10 pennyweights, and this only in one case, but in others running from 1 ounce, 3 ounces, up to 15, 34, 66, and even 71 ounces to the ton. As to diamonds, it is claimed that those found in the country are of far better color than the production of Kimberly and the Vaal River. Mr. Powell is of opinion that "few, if any, countries in the world will offer greater facilities for the British employment of capital where the risks are so few and the opportunities of making such large profits so many. This is a territory that for gold mining is, one of these days, likely to come into prominence."

DUTCH GUIANA.

The export of gold from Dutch Guiana in 1894 was valued at 1,619,000 guldens, or $650,838, corresponding to 979 kilograms, against 1,065 kilograms in 1893.

Gold mining in Dutch Guiana will in the future be promoted by law, the approval of which by the mother country, the Netherlands, is expected to be received soon. This law subjects the industry of gold mining to strict control, and its provisions are to be enforced by heavy penalties. Only persons provided by the Government with a patent, for which they are required to pay yearly 250 guldens, are henceforth to be allowed to purchase gold. Every discoverer of gold is by the terms of this law required to pay the Government 7 cents for every gram of gold instead of the export duty at 5 per cent which has heretofore existed. The transportation of gold without a stamp and a transportation ticket is prohibited.

The gold-mining industry will, it is believed, become very important in Dutch Guiana when hydraulic machinery is fully introduced. Hydraulic machinery has been purchased and partly erected in the four larger gold washings of the country. The diminished output of gold in 1894 is to be ascribed to the fact that much of the labor of the country was employed during the year in the transportation and erection of this hydraulic machinery.

The first experiments with the hydraulic machinery were very successful. Two pounds of gold were obtained by machinery in the same time and at the same place where only the maximum of 15 grams could be secured by manual labor.

FRENCH GUIANA.

The production of gold in French Guiana in 1894 is estimated to have been about 2,000 kilograms.

GOLD RUSH IN FRENCH GUIANA.

[From the Board of Trade Journal, London, November, 1894.]

Mr. Sidney J. A. Churchill, British consul at Paramaribo, in a report to the foreign office, dated October 6, gives the following interesting particulars respecting the sudden attack of gold fever which since the beginning of this year has visited the colony of French Guiana:

"Although alluvial washing for gold has been successfully undertaken in French Guiana for the last thirty years, in January last, owing to the discovery of a rich pocket of gold in the district of Carsevenue, situated within the area of territory in dispute between Brazil and Cayenne, nearly every able-bodied man in Cayenne abandoned his employment and hurried to the seat of the new discovery.

"The news that the discoverer of the pocket had come away from it with 300 kilograms of gold immediately spread over the adjacent colonies of Dutch and British Guiana and the West India islands. Many hundreds of hands flocked to Cayenne from all over the world; and although I have not yet succeeded in obtaining sufficiently reliable statistics as to the cost and extent of the production of the precious metal, I hasten to report the fact that the Carsevenue pocket and its neighboring area of about 25 miles square of ground have been completely exhausted of the mineral wealth which originally lay therein.

"My principal object in hastening to submit this fact is in order that the publication of it may prevent more British subjects who may have been allured by the reports which have been spread abroad by the press of the discovery of a large gold field in Cayenne from betaking themselves to that colony in the vain hope of easily accessible wealth.

"The more recent expeditions to Carsevenue have not paid their expenses, and the stores and other material taken to the district at enormous expense have been abandoned there by their owners."

ITALY.

Concerning the production of gold and silver in Italy in 1894, our ambassador to that Kingdom writes under date of April 24, 1894:

The ministry of the treasury has, as yet, received no statistics from the royal inspector of mines in regard to the production of gold and silver in the mines and refineries of Italy. There is reason for believing, though, that the production for 1894 will differ but slightly from that of the previous year.

The gold and silver output of the Italian mines in 1894 is, therefore, assumed in this report to have been the same as in 1893.

JAPAN.

The production of gold and silver in Japan in the calendar year 1894 is calculated in this report by adding the product of the Imperial Household mines in 1894 to that of the private mines in 1892, thus:

GOLD PRODUCT OF JAPAN IN 1894.

Mines.	Gold.		Silver.	
	Weight.	Value.	Weight.	Value.
	Kilograms.	*Yen.*	*Kilograms.*	*Yen.*
Government mines in 1894	341. 9235	427, 294. 804	9, 930. 0480	385, 582. 079
Private mines in 1892	395. 5013	304, 456. 440	50, 939. 4781	2, 049, 695. 954
Total	737. 4248	731, 751. 244	60, 869. 5261	2, 435, 278. 033

The values of silver given in the above table are commercial values. The coining value of the silver product of Japan in 1894 was $2,529,700, and of the gold product $489,800, at which figures they appear in the table of the world's production of gold and silver in this report.

GOLD AND SILVER MINING IN JAPAN.

[By Professor Hauchecorne.]

The gold and silver mining of Japan is of considerable importance. There are a great many mines worked in the country. These mines are situated on all three of the principal islands of the Empire, along the central mountain chain, which runs through them all, but especially on the west side of the chain.

The deposits consist mostly of lead and copper ores, which, according to a report of the director of the mining bureau in the ministry of agriculture and commerce in Tokyo, belong chiefly to the tertiary period. In the archaic, paleozoic, and mesozoic formations gold ores are indeed to be found, but much more sparsely than those above mentioned. A number of these lead and copper lodes are also auriferous.

Alluvial gold is obtained in small quantities. By far the largest output of gold is obtained on the island of Sado, in the two lode mines of Aikawa and Tsurushi. Gold alluvions were found here as far back as at least nine hundred years. The ore deposits were discovered at Tsurushi in 1593 and at Aikawa in 1601.

It is said that the yield of those mines was extraordinarily high in the first half of the seventeenth century. In the above mines four lodes with a thickness of as high as 30 feet are worked. The ores of these mines are auriferous silver ores, gravelly copper ores, friable galena, sulphide of zinc, and iron pyrites. There is no lack of native gold. Mining has reached a depth of from 850 to 900 feet in two shafts a depth which, considering the great age of the mine, appears rather moderate. The deepest shaft, 765 feet, of the gold and silver mine of Ikuno is in the province of Tajima, in whose tertiary layers mining has been carried on for over a thousand years.

In the silver mine of Inai, in the province of Ugo, which has been operated since the beginning of the seventeenth century, there is a shaft 485 feet in depth. The Handa silver mine, in Fukushima, in the north of Nippon, is also worthy of mention. This mine, with a dip of from 40 to 60 degrees, has reached a depth (flache Teufe) of 2,530 feet.

In this and other mines of the territory the deposits show no diminution with the depth of their contents in precious metals. Rather has their production in recent years largely increased, as may be seen from the following figures:

Years.	Gold.	Silver.	Authority.
	Kilograms.	*Kilograms.*	
1881	305	17,881	According to official report.
1882	272	17,399	
1883	301	24,158	
1884	275	22,927	
1885	274	23,862	
1886	465	33,722	
1887	521	35,657	
1888	630	42,786	
1889	769	43,016	
1890	727	52,903	
1891	765	43,282	According to director of mint.
1892	765	43,282	

Of the gold production of the year 1890, namely, 727 kilograms, 120 kilograms were obtained from alluvial gold and 607 kilograms from gold lodes and from separation of silver from copper and lead. The official report of the director of mines in Tokyo says:

"The mineral worth of this country, as now known, is something enormous. The coal in Hokkaido and Kiushiu, antimony in Shikoku and Kiushiu, and gold, silver, copper, and iron in these and other provinces seems almost inexhaustible."

GOLD AND SILVER PRODUCT OF JAPAN.

[From the Report on Japanese Currency, London, 1894.]

The product of the mines from 1885 to 1891 was, gold, about 108,000 ounces and silver, about 7,460,000 ounces. This product, if correct, would have been upward of 2,000,000 gold yen and 8,000,000 silver yen, or an average of 333,000 gold yen and 1,333,000 silver yen per annum.

The table annexed will show that the production of silver is relatively increasing.

Year.	Gold.	Silver.
	Ounces.	*Ounces.*
1885-86	8,827	767,656
1886-87	14,963	1,084,852
1887-88	16,768	1,147,713
1888-89	19,057	1,376,436
1889-90	24,709	1,382,611
1890-91	23,632	1,703,878

KOREA.

The production of gold in Korea in 1894 is, in the present report, estimated to be equal to the export of the metal from Korea to foreign countries, viz, $934,075 (Mexican). As the average value of the Mexican dollar in United States gold in 1894 was $0.50, this makes the estimated gold output of Korea in 1894 $467,037, corresponding to 703 kilograms, fine.

This Bureau has no information relative to the silver product of Korea in 1894.

MADAGASCAR.

That gold is to be found in Madagascar is not extraordinary. Large quantities of that metal exist in South Africa, which is not far distant from Madagascar. The Transvaal is separated from the southern part of the island only by the Mozambique Channel, that is, by a distance of from about 250 to 300 miles.

The Hovas have for a long series of years prohibited prospecting for gold, but some years ago it was authorized in the interior.

Auriferous mines have been discovered in the plains and mountains of the west. In the discussion on the mines of South Africa and their influences on the price of commodities and on the future of bimetallism by the Society of Political Economy of Paris, on January 5, 1895, a discussion in which Messrs. de Molinari, J. Siegfried, Raffolovich, Houdard, Juglar, Raphael Levy, and Pierre des Essards took part, the latter claimed that 12,000,000 francs of gold were, according to private information, exported every year from Madagascar.

PRODUCTION OF GOLD IN MADAGASCAR.

[From the report of John L. Waller, United States consul at Tamatave, Madagascar, East Africa, September 10, 1892, published in the Report of the Committee on Agriculture and Forestry, Washington, 1895.]

It is generally conceded by competent persons that gold exists in paying quantities in Madagascar, and were it not for the fact that the Malagassy Government persists in charging such an unreasonable percentage, viz, 56 per cent, on all gold or silver found, and that the prospectors have to furnish all the machinery, gold mining, I doubt not, would become a profitable business in a very short time.

A large amount of alluvial gold is gathered by the natives and sold in large and small quantities to men of means, who make it a business to traffic in this precious metal. Bankers and other persons export annually to England and France thousands of pounds of gold.

I requested the customs officers at Tamatave to furnish me with a statement showing the exportation of gold, but they did not seem inclined to do so. I am sure that if a true statement could be obtained some very interesting as well as astonishing figures could be shown.

I deem it highly important to lay before the American business men the following statement, found in the official report of the British acting consul, Mr. Clayton Pikersgill, for 1890–91. Mr. Pikersgill says:

"During the past year about 18,200 ounces of gold have passed through the capital for exportation by way of the east coast. Adding 10,000 ounces as a moderate estimate of the quantity which has left the island via the west coast, and calculating that 10,000 ounces are hoarded in the city and its vicinity, we arrive at a rough total of £110,000 worth of gold as a result of twelve months' scratching at the surface of the country's mineral deposit, a by no means unpromising output, considering that ten years in chains was named as a punishment for persons found in possession of gold dust and that mining is prohibited under a penalty of twenty years in chains.

"This unsatisfactory state of things is on the eve of removal, and long before the close of the year a general mining development, by natives at least, is expected."

Commenting upon the above report in its issue of August 13, 1892, the Madagascar News says:

"As it is, Mr. Pikersgill's estimate of the illicit gold output is known to be far within the mark. Some authorities place the actual output at a very much higher figure than 38,200 ounces annually. However, even the standard is quite sufficient to show that with gold mining permitted without restriction the gold output will, apart from all other produce, more than establish a balance of trade."

The report of Mr. Pikersgill, as a matter of fact, covers only English exportations, and is, therefore, a very partial statement, since fully as large shipments are sent to France, Germany, and Italy, of which no statistics are at hand.

But, until a more liberal fee for mining shall be allowed by the native Government and the political status settled, I think it would be unwise for Americans to invest any capital in mining enterprises in Madagascar.

MEXICO.

Through Mr. E. C. Butler, chargé d'affaires of the United States at the City of Mexico, this Bureau has received the following information relative to the gold and silver production of that Republic during the calendar year 1894:

GOLD AND SILVER PRODUCTION OF THE REPUBLIC DURING CALENDAR YEAR 1894.

Description.	Kilograms.	Value.
GOLD.		
Coined	861.0444	$554,107
Exported	3,156.2030	2,131.931
Total	4,017.2474	2,686,038
SILVER.		
Conied	753,817.100	29,481,033
Exported	709,543.666	29,030,979
Total	1,463,360.760	58,512,012
RÉSUMÉ.		
Gold	4,017.2474	2,686,038
Silver	1,463,360.7600	58,512,012
Total	1,467,378.0074	61,198,050

NOTE.—These amounts do not represent the total aggregate of the production of gold and silver in Mexico during the year 1894. The amounts hereinbefore cited constituted, however, two of the most important elements thereof. Data is lacking for the estimate of the quantities of precious metals remaining in possession of miners or smelters, as well as such as are deposited in bullion in banks, employed in arts or industries, or smuggled out of the country, despite the many precautions taken by the Government to avoid smuggling.

The production of silver in Mexico, given above, appears in the table of the world's production of gold and silver as the silver product of Mexico in 1894, this Bureau having no data of the quantities of the white metal retained by miners and smelters, or of those deposited in banks, employed in the industrial arts, or clandestinely exported.

In the case of the gold production of Mexico in 1894, however, this Bureau has been compelled to change the items of the exports, for the reason that the imports of gold bullion and the amount of gold extracted by private refineries in the United States from imported Mexican ores in 1894 were considerably larger than the total exports of gold given above.

The amount of gold bullion imported from Mexico and deposited at the United States Assay Office at New York and at the mint at San Francisco is made evident by the following correspondence:

THE UNITED STATES ASSAY OFFICE AT NEW YORK,
SUPERINTENDENT'S OFFICE,
May 27, 1895.

SIR: In compliance with yours of the 24th instant, I herewith submit a statement of the amount of gold bullion received at this institution from Mexico during the calendar year 1894, viz:

	Ounces, standard.	Value.
Gold deposits	14,909 736	$277,390.44
Gold partings	24,638.818	458,396.61
Total	39,548.554	735,787.05

Respectfully, yours,
JAMES W. CORSA, *Acting Superintendent.*
DIRECTOR OF THE MINT,
Washington, D. C.

THE MINT OF THE UNITED STATES AT SAN FRANCISCO,
SUPERINTENDENT'S OFFICE,
May 31, 1895.

SIR: In reply to your favor of the 24th instant I have the honor to report that during the calendar year 1894 the following Mexican bullion was deposited in this mint, viz:

	Ounces, standard.
Gold	15,625.864
Silver	4,091.36

The silver deposits represent the silver contained in gold deposits.

Respectfully, yours,
ROBERT BARNETT, *Acting Superintendent.*
DIRECTOR OF THE MINT,
Washington, D. C.

THE UNITED STATES ASSAY OFFICE AT NEW YORK,
SUPERINTENDENT'S OFFICE,
May 29, 1895.

SIR: In reply to yours of the 27th instant, as to whether any of the gold partings contained in my statement of gold bullion received from Mexico during the calendar year 1894 was received from private refineries in the United States, I would say that all of it was separated from bullion received direct from Mexico. Most of this bullion contains more or less gold, a portion of it running as high as one-seventh pure gold.

Respectfully, yours,
JAMES W. CORSA, *Acting Superintendent.*
DIRECTOR OF THE MINT,
Washington, D. C.

In view of the fact that private refineries in the United States extracted 114,202 ounces, fine, from Mexican ores and bullion imported into this country in 1894, and of the data contained in the above letters, this Bureau feels constrained to use the figures supplied it by the private refineries of the United States and by the superintendents of the

United States Assay Office at New York and the United States Mint at San Francisco, instead of the figures officially communicated to it by the Mexican Government. The gold product of Mexico in 1894 would, therefore, be estimated thus:

Description.	Weight.	Value.
	Kilograms, fine.	
Gold coined in Mexico	861.0444	$572,250
Gold extracted from Mexican ores and bullion by United States private refineries	3,552.1617	2,360,765
Gold bullion deposited at United States Assay Office at New York	1,107.1134	735,787
Gold bullion deposited at United States Mint at San Francisco	437.4270	290,713
Total	5,957.7465	3,959,515

As Mexico exports large quantities of gold ore and, doubtless, some bullion to Germany, England, and other countries, and considering that it retains some at home, while it employs a small amount in the industrial arts, an estimated gold product of Mexico in 1894 of $4,500,000, or 6,771 kilograms, fine, may be considered a moderate figure at which to place its output of gold; and it is placed, accordingly, at those figures in the table of the world's production of gold and silver in the present report.

PRODUCTION OF GOLD AND SILVER FROM THE MINES OF MEXICO, 1873–1894.

Year.	Gold.		Silver.		
	Ounces, fine.	Value.	Ounces, fine.	Commercial value.	Coining value.
1873	(1)	....	19,344,296	$25,108,900	$25,010,808
1874	(1)	....	19,344,296	24,722,000	25,010,808
1875	(1)	....	19,344,296	24,103,000	25,010,808
1876	(1)	....	19,318,582	22,332,300	24,977,560
1877	48,225	$996,900	20,897.507	25,097,900	27.019,000
1878	48,225	996,900	20,897,507	24,073,900	27,019,000
1879	47,853	989,200	19,465,720	21,860,000	25,167,800
1880	47,853	989,200	19,465,720	22,288,200	25,167,800
1881	41,549	858,900	21,405,269	24,359,200	27,675,500
1882	45,289	936,200	22,613,610	25,689,100	29,237,800
1883	46,246	956,000	22,869,773	25,385,400	29,569,000
1884	57.228	1.183,000	21,082,359	23,464,700	27,258,000
1885	41,941	867,000	24,836,625	26,438,600	32,112,000
1886	29,702	614,000	25,523,437	25,385,600	33,000,000
1887	39,861	824,000	29,058,046	28,425,500	37,570,000
1888	47,117	974,000	31,999,429	30.046,500	41,373,000
1889	33,863	700,000	31,565,918	29,517,900	40,812,500
1890	37,104	767,000	31,829,660	33,304,300	41,153,500
1891	48,375	1,000,000	34,847,381	34,422,900	45,055,200
1892	54,625	1,129,200	39,504,867	34,411,100	51,077,000
1893	63,144	1,305,300	44,362,519	34,616,500	57,357,600
1894	217,688	4,500.000	47,038,381	29,859,500	60,817,300
Total	995,888	20,586,800	586,615,198	594,913,000	758,451,984

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[1] From 1873 to 1876 the gold production of Mexico was included in Central and South America's product.

MINING LAWS, RULES, TAXES, ETC.

[From the Mexican Financier, June 9, 1894.]

LAW FOR THE ENCOURAGEMENT OF GOLD MINING IN MEXICO.

Congress has passed a law empowering the Executive to grant during one year special concessions to prospectors and operators of gold mines and placers.

For the purposes of the law a gold-bearing region is defined to be one in which the commercial value of the gold extracted exceeds that of all the other metals with which it is associated. As soon as the nature of the ore changes in such manner that the value of the gold contained does not exceed that of all the other concomitant metals, all the special concessions and privileges hereafter mentioned shall be regarded as revoked.

The limits of each exploration zone shall be clearly defined in the respective concession. Within such zone the concessionaires are to be at liberty to take up as many claims as can be located on unoccupied territory, and to incorporate with the zone exterior claims already belonging to them or such as they may subsequently acquire by purchase or other legal means.

Concessionaires are to be granted an exclusive exploration permit, good for six months, empowering them to prospect the zone covered by the concession.

They are to have the right to import machinery, tools, appliances, and apparatus of all kinds used in the prospecting and operation of gold mines, as well as building material for the mines and reduction works, without payment of customs duties.

They are to enjoy a reduction in the annual mining tax for a period not exceeding ten years, paying in the first year one-tenth of such tax, and an increasing amount every year until the full tax becomes payable in the eleventh year.

They are also to be free for ten years from all Federal taxation, with the exception of the tax mentioned in the foregoing paragraph, of taxes payable in stamps and of mintage and assay dues.

They are to spend in prospecting and developing work at least $500,000 during the first three years and another $500,000 during the five following years.

A deposit of earnest money of not less than $10,000 in securities of the public debt will be required, to be returned to the concessionaire when $200,000 have been invested.

The exemption from taxes spoken of above does not refer to the operation of alluvial gold. The discoverers of such gold shall pay while operating it one-third of the regular taxes.

Within two years from the issue of the concession the concessionaire shall be required to erect a metallurgical establishment capable of treating at least 400 tons of ore per week or shall execute some other public improvement of equivalent value to be determined by the department of encouragement.

RULES ISSUED BY THE TREASURY TO SECURE ACCURATE RETURNS OF EXPORTS.

The necessity of securing fuller returns of Mexico's production of the precious metals becoming daily more apparent, the treasury has issued a circular laying down certain rules to be observed, on and after July 1 next, by all exporters of these metals. Said exporters must, on applying for export permits, make a declaration covering the following particulars:

(1) Mexican gold and silver coins are to be declared at their full nominal value. Foreign coins are to be declared under the name by which they are known in the country to which they belong, without declaration of value in Mexican money.

(2) Gold and silver, pure or mixed, in bullion, in bars, or in pigs, are to be declared with complete accuracy, the weight of the pure gold and pure silver contained in the bullion being given in kilograms, without reference to their value.

When the gold and silver have not been entered previously at a mint, the custom-house through which the exportation takes place shall furnish these particulars in lieu of the exporter, on receipt of the certificate of assay for the assessment of export dues.

(3) If the bars, pigs, etc., be of argentiferous lead or argentiferous copper, the weight of the lead or copper contents is to be declared, as well as that of the pure silver. Moreover, the value of the silver in Mexican dollars, at the rate of $40.915 per kilogram, as well as that of the lead or copper, at the market price current at the point of export, or at the nearest Mexican market, are to be stated.

(4) In the exportation of gold and silver ore the weight of the pure gold or silver contents, as well as the gross weight of the ore, is to be declared. In regard to value, only the price in Mexican dollars at which the ore has been bought is to be stated, or, in lieu thereof, if the ore has not changed hands, the value of the same in the rough, or as exported, must be given, care being taken in no case to confuse such value with that of the metals subsequent to treatment.

(5) In the exportation of ore powder, sulphides, etc., the same rules are to be followed as in the case of other ore shipments.

[From the Mexican Financier, May 18, 1895.]

THE NEW TAXES ON GOLD AND SILVER.

In addition to the taxes imposed by articles 4, 5, and 7 of the decree of June 6, 1887, silver and gold shall pay to the Federation the following mintage stamp, refining, melting, assay, and separation dues:

A. From and after July 1 next the deduction hitherto made on the intrinsic value of gold and silver entered at the mints, for the purpose of defraying the cost and fees of mintage, shall be abolished.

In consequence, persons entering the precious metals shall be credited for each kilogram of pure silver at the rate of $40.915, and for each kilogram of pure gold at the rate of $675.417. These values shall be taken as the basis for the estimation of the mintage and stamp dues hereafter to be mentioned.

B. The mintage fees on gold and silver shall be reduced to 2 per cent of their value, payment of such fees being made in silver coin.

C. The stamp tax imposed by the law of April 25, 1893, on certificates (1) issued by the mints, and that imposed by the same law on gold and silver in bars (2) are hereby repealed and in their stead a new stamp tax on gold and silver is created, the amount of said tax to be 3 cents per $1 on the value of the gold and silver.

From the payment of this tax no one shall be exempted.

D. The mintage and stamp dues shall be payable not only with respect to silver and gold entered at the mints, but with respect to bars of either metal or of the two metals mixed that may be exported. Also with respect to silver sulphides, to argentiferous lead and copper, to ores in the natural state, to concentrates or ore only partially dressed, and to any alloy, object, or substance containing gold or silver.

(1) $0.02 per $20, or fraction thereof.

(2) $0.03 per $5, or fraction thereof.

E. The mintage and stamp dues shall be paid in the assay offices or at the mints, with respect to gold and silver introduced for coinage, and in the same offices or at the maritime or frontier custom-houses with respect to gold and silver exported in any form.

F. The only exemption from the payment of the mintage fee with respect to silver exported shall be enjoyed by the metallurgical establishments at present enjoying such exemption under their concessions, provided always that the proportion of silver in argentiferous lead does not exceed seven-thousandths, and that in argentiferous copper fifteen-thousandths, for, in case the proportion of silver exceeds the amounts named, said establishments shall pay the mintage fee with respect to the excess.

G. Ores of gold or silver exported in the natural state, or only concentrated mechanically shall be subject to the mintage and stamp taxes with respect to the value of the gold or silver which they contained, with an allowance of 5 per cent.

H. The exemption with respect to three-thousandths, which all the exporters of certain classes of metal have enjoyed, is abolished.

I. The refining, melting, assay, and separation fees shall be collected according to a schedule of prices to be formed and published by the finance department.

J. The owners of silver bars containing gold may have the separation of these metals performed in private establishments, and in case they introduce mixed silver into a Government assay office they may have the gold separated up to the limit desired on payment of a separation fee per kilogram in accordance with a schedule to be issued by the department of finance.

K. The Federal Executive shall issue the necessary rules of practice for the enforcement of the above taxes, and shall fix the penalties to be visited on persons who shall attempt to evade, or shall evade, the payment of the taxes on gold and silver, of which the exportation without payment of mintage and stamp taxes shall be considered as a case of contraband.

L. From and after July 1 next all laws and regulations with regard to Federal taxation on gold and silver, opposed to the foregoing bases, shall be repealed.

GOLD AND SILVER MINES OF MEXICO.

[By Professor Hauchecorne.]

Mexico ranks second in the list of silver-producing countries, but its gold production has hitherto been unimportant. The occurrence of rich gold lodes has been observed over the entire extent of the Republic, from the northeastern State of Sonora, bordering on Arizona, to Oaxaca, on the Gulf of Tehuantepec.

On the other hand, Cusihuiriachic, in Chihuahua, and the new mining district of Mapimi (south of Chihuahua) and Sierra Mojada, in the State of Coahuila, as well as those of Durango and Sonora, opened up during the last decade, are entering on an era of prosperity.

The districts of Toluca, Morelia, and Guadalajara are all less important. The ores are obtained directly from lodes which are found in conditions very similar to those of the western portion of the United States in combination with older dioritic and porphyritic, and more recent trachytic eruptive rocks, like the lodes of Santa Maria, at Carmen, in Sonora, of Catorze, Fresnillo, and Zacatecas; while others, like the celebrated Veta Madre of Guanajuato, for instance, are found in archaic and paleozoic stratified rocks. Mining in some of the latter districts has already reached great depths; for instance, in Pachuca, from 300 to 400 meters (980 to 1,300 feet); on the Veta Madre, in Guanajuato, in the mine of La Valenciana, 622 meters (more than 2,000 feet).

The ores are mostly silver ores proper, of rich, compact occurrence, but chiefly so-called dry ores, that is, poor silver ores finely injected into earthy gangues. These latter ores can be mined in large masses and be profitably worked by amalgamation. A large portion of the better ores are exported.

The discovery of rich deposits of argentiferous lead ores in Sierra Mojada in the year 1879 was of great importance. These ores were at first exported to the United States and employed there for the better smelting of the domestic ores of that country. The imposition of the heavy import duty by the United States on these ores led to the erection of two large lead and silver smelting works at Monterey in Nueva Leon, and at San Luis Potosi.

A new period of development of the entire mining and smelting industries of Mexico has been begun by the creetion of railways in recent years. The main railway line stretches from Mexico northwest to El Paso del Norte, on the northern frontier, and connects with the railway system of the West of the United States.

From this main line, branch lines stretch easterly from Orizaba to Vera Cruz, on the Gulf of Mexico, and westerly from Guadalajara, toward Tepic and San Blas, on the Pacific Ocean, as well as a number of smaller roads toward the centers of the principal mining districts. Up to that time the greatest difficulty lay in the want of roads and other media of communication and transportation. The gradual removal of these difficulties will doubtless exercise very beneficial influence on the mining interests of Mexico.

It is expected from the improved means of transportation that the still young silver-mining industry in Durango and the gold-mining industry of Oxaca, in which gold beds are known to exist, will be greatly promoted. The production of gold in Mexico hitherto has been confined to a very limited portion of the gold deposits. Indeed, gold has been produced hitherto in Mexico only as a by-product in the production of silver and the working of silver ores.

NEW CALEDONIA.

In connection with the consideration of gold production in Australasia and New South Wales, it may be mentioned that gold quartz lodes in paleozoic quartzites have been found on the Island of New Caledonia, which is closely connected, geologically, with Australia and New Zealand. No large output, however, has yet been found on the island.

According to Professor Hauchecorne, gold also exists on a part of the larger and smaller Sunda Islands, but no large quantity has yet been obtained there.

NICARAGUA.

In accordance with the figures mentioned in the paper published below and translated from the Annales des Mines, the gold product of Nicaragua in 1894 is placed at 708 kilograms, of the value of $470,537.

The author of the paper just referred to is Mr. Daniel Bellet. The material used by him was supplied mainly by the publications of the Bureau of American Republics; the Noticias Geográficas de la República de Nicaragua, by D. Gamez; and by a report of Mr. Newell, consul-general of the United States to Nicaragua.

Mr. Bellet's paper is as follows:

THE PRODUCTION OF GOLD AND SILVER IN NICARAGUA.

The work of Mr. José D. Gamez (Noticias Geográficas de la República de Nicaragua) calls attention to the vast mountain system which extends as far as the Atlantic Coast as constituting the mineral region par excellence of Nicaragua. Up to the present time, however, only simple explorations have been made in Nicaragua, and the work of exploitation is concentrated almost exclusively in the departments of Nueva Segovia and Chontales, known for their auriferous deposits.

The former is situated on the frontier of Honduras, on the course of the Coco or Wanles River. The second extends along the eastern shore of Lake Nicaragua. Gold mines are the only ones worked in Nicaragua; the silver mines, which gave a fabulous output in the sixteenth and seventeenth centuries, are now abandoned, and can not now be worked, considering the depreciation of that metal, except on condition of employing in the treatment of their products the very best and latest processes. According to D. Gamez, the total production of gold may be estimated at 22,754 ounces per annum, or about 708 kilograms. The ores of Chontales contain from one-quarter of an ounce to 2 ounces of gold per ton of 2,000 English pounds

(907 kilograms); this gold is from 14 to 20 carats fine. The ores of Nueva Segovia have a contents of from one-half an ounce to 3 ounces per ton. Up to the present time, notwithstanding the fact that all the mines discovered hitherto were considered very rich, the mineral industry is not developing, on account of the insufficiency of capital, and especially of the state of the means of communication.

According to a report of Mr. Newell, consul of the United States, the departments of Nueva Segovia and of Chontales supply all the gold which is at present exported.

The following table sums up the average production per month of thirteen mines of the department of Chontales:

Name of mine.	Carat fineness.	Ounces to the ton.	Monthly production.
			Ounces.
San Juan de Canidad	15	½	30 to 40
Babilonia	16 to 17	¼ to ½	100 to 200
Los Angeles	14	¼	30 to 40
La California	14	¼ to ½	30 to 40
Santa Elena	17	¼ to ½	140
El Escandalo	15	¼	150 to 200
La Esmeralda	18	¾	100 to 200
El Tope	19 to 20	¼ to ½	100
El Chamowo	16 to 17	¼ to ½	100 to 150
El Javali		[1] ¾	200 to 300
San Miguel		1 to 2	30 to 40
Santo Domingo		½	50 to 100
San Gregorio	(2)	(2)	100 to 200

[1] The consul reports this yield as follows: 1 castellano (one one-hundredth of a Spanish pound) to three-quarters of an ounce per pound (sic).

[2] Ounces per ton and carat not obtainable.

Or a total of 1,160 to 1,750 ounces—that is, an average monthly production of about 45 kilograms of gold. The ore is crushed most frequently by means of mullers, sometimes of the ordinary system and sometimes of the California system, the motive power being water or steam. In the department of Segovia only ores with a much larger contents can be worked, owing to the absence of good roads in transporting to the mines the necessary machines, except when a rather large output is assured.

There are, however, some twenty mines in exploitation in the districts of Jicarro, Mura, Los Encinos, and Las Veultas, but in the district of Telpaneca there are at least a dozen which remain undeveloped, owing to the lack of capital. The district of Cujé contains, it seems, very rich beds; unfortunately the lack of water, for the trituration of the ore, makes their exploitation very unprofitable.

In those mines, and in the richest of them especially, the old process, called molinete, is employed. Mr. Newell estimates the monthly production of the mines of the department of Nueva Segovia, exclusive of those of Cujé, at about 900 ounces of gold or, 28 kilograms.

In the departments of Segovia, of Chontales, and of Matagalpa vestiges of old exploitations of placers by the Spanish conquerors are found. From the study made by Dr. Bruno Mierisch, the Government geologist of Nicaragua, it would seem that the richest placers are those of the rivers Prinzapulca and Wawa, on the Atlantic shore. The district of Wawa is situated on the upper course of that river, which forms a lake of the same name before it flows into the sea; that of Prinzapulca is farther to the south.

The ores there contain from 0.01 to 0.015 per cent of the precious metals, gold and silver (95 to 136 grams per ton, or 907 kilograms). Mr. Newell estimates that the extraction from these placers reaches at least 600 to 800 ounces. He adds that in the district of Muy Muy Viejo two exploitations have just been opened, the deposits containing as much as 8 ounces to the ton.

The treatment of the ores in Nicaragua is generally done by the most primitive processes. One of the processes still most in use is that of the molinete, which is nothing but the Mexican arastra. The molinete is composed essentially of a paved circular area, from 1.80 to 6 meters in diameter, confined by a wall of wood about 0.60 meter in height. In the center of this vat a wooden vertical shaft is placed from which two or more arms extend; to each of the arms there is fixed by chain a stone muller. The central shaft is moved by mules or by a hydraulic motor, and performs from six to ten revolutions a minute. Before being subjected to the actions of the mullers the mineral is first reduced to pieces a little smaller than a hen's egg. The quantity subjected to treatment in twenty-four hours is from 1.5 to 2 tons. First, 90 kilograms of ore are charged with a little water; a quarter of an hour afterwards from 180 to 230 kilograms are added; when the mass has been reduced to a rather fine slime 1 or 2 ounces of mercury are then thrown upon it. A spoonful of the composition is taken from time to time and an assay made. If it is seen that there is a little free gold more mercury is added. After from four to five hours the residue is diluted with water and the apparatus unloaded. From 1 to 1½ ounces of mercury is used for 1 ounce of gold. The amalgam becomes deposited in the crevices of the bottom of the vat, but a large quantity of mercury added in excess is frequently lost.

The full text of Mr. Newell's report on the gold mines of Nicaragua is here reproduced:

THE MINES OF NICARAGUA.

I desire to call attention to the rich mineral zones that are now being operated in the Republic of Nicaragua.

Besides the vast mountainous system, extending to the Atlantic, rich in minerals, but yet unexplored, there are the auriferous mineral districts of New Segovia and Chontales, which to-day produce the gold ore that is exported from this Republic.

The mineral district of La Libertad, in Chontales, is the most ancient, as well as the best developed, in the country, though the machinery is as yet of the most primitive character. The incomes of the mines vary from half an ounce to 2 ounces per ton and the quality of the gold from 14 to 20 per carat.

Most of the machinery used in these mines is moved by rude hydraulic turbine wheels and steam power. The machinery generally consists of one or more batteries of four large mallet triturators of the California system and one or more cups in which the ore is beaten or ground.

In Boaco, of the same department of Chontales, there are two mines, but they are operated in the crudest way. One is worked by means of an old mallet engine, the other by an ancient system that they called "molinete." The first produces 200 ounces, the second 128.

In the department of Segovia the mines are richer, but the bad condition of the roads makes the introduction of machinery very difficult, so that no gold vein is worked that yields less than 1 ounce per ton.

All the hills, all the mountains, and almost all the rivers in that department contain veins, placers, and pockets of gold and silver, croppings of copper, tin, antimony, lead, and other metals, samples of which formed a conspicuous part of Nicaragua's exhibit at the Paris Exposition.

Nevertheless, almost the entire region remains undeveloped, with the exception of the mines Macuelizo and Dipilto, which in times past gave rich production of silver to the old Spanish colony, and are to-day abandoned only because there is more to be made in gold mining.

In the mineral districts of Jicaro, Murra, Los Encinos, and Las Vueltas there are no less than twenty mines in operation, with six plants of machinery of ancient construction which are used in reducing gold ores.

The district of Telpaneca, which comprises also San Juan and El Pericon, has at least twelve mines that are nonproducing because of the miners' lack of capital.

Then, again, there are mines of extraordinary richness in the district of Cujé that are not operated with profit for the want of running water to triturate the ore. Most of the mines in this district, especially the extremely rich ones, are operated by the imperfect system of molinete.

Taking as a basis two tons of ore that are ground each twenty-four hours by the machinery of the different mines in New Segovia, it is ascertained that the monthly output is 900 ounces of gold, without considering the ores reduced in the district of Cujé by the molinete process.

There are in Segovia, Chontales, and Matagalpa vestiges of placer diggings that were worked with profit in the days of the Spanish conquerors. The richest placer diggings are those along the Prinzapulca and Wawa rivers, on the Atlantic coast.

Dr. Buno Mierisch has made an important geological study of the Prinzapulca district, having analyzed ores from thirteen of the mines of that section, especially minerals from Cincuina, La Concepcion, El Dorado, Pis-Pis, and Cuenca del Cucalaia.

Dr. Mierisch is the official geologist of Nicaragua. He has made a voluminous report upon the mineral district of Prinzapulca, covering sixty-two pages of foolscap. Up to the present time his report has not been made public.

The veins of the Prinzapulca and Wawa districts contain both gold and silver, and in the proportion of 0.001 to 0.015 per cent of gold to 0.001 to 0.015 per cent of silver in each ton of ore of 2,000 pounds.

So far I have found it impossible to secure any statistics as to the monthly output of the placer mines; but probably, taking into account the great value of the waters of the River Wawa for extracting the ore, the output can not fall below 600 to 800 ounces.

In the mineral district of Muy Muy Viejo (Matagalpa) they have just established two mining enterprises on veins whose yield is said to be fabulous, amounting to 8 ounces to the ton. I have found it difficult to verify this statement, though as these mines are located in a district known to be exceedingly rich, it may be true.

The molinete system, already mentioned, is the same as that known in Mexico as the arastra. The arastra is composed of a circular granite-paved bottom, from 6 to 20 feet in diameter, surrounded by a wooden inclosure over 2 feet high, with a vertical wooden shaft in the center provided with two or more projecting arms, to which mullers composed of large blocks of granite are attached by means of chains. This primitive but effective machinery is operated by mules when water power is not available. The mullers make from six to ten revolutions per minute, with a capacity of grinding from 1½ to 2 tons of rock (the fragments being broken as small as a hen's egg or less) in twenty-four hours. Of the arastra, Mr. Kustel, a high authority, writes as follows:

"When in motion the arastra is charged with 200 pounds of ore, with some water. One-quarter of an hour afterwards the balance of the whole charge, from 400 to 500 pounds, is introduced. As soon as the ore is turned into mud 1 or 2 ounces of quicksilver are pressed through a dry cloth over the thick pulp.

"A sample is taken from time to time with the horn spoon, washed, and examined. When free gold is perceived, after the amalgamation has gone on for some time, some more quicksilver may be added. The first charges require a little more quicksilver. After four or five hours the pulp is diluted with water and discharged.

"The next charge is treated in the same way, and so on till 100 or 150 tons are worked through. The quicksilver must be used always in proportion with the gold—1 or 1½ ounces to 1 ounce of gold. The amalgam imbeds in the crevices of the bottom, and must be always dry.

"The use of too much quicksilver makes the amalgam thin, causes an imperfect amalgamation, and a loss in quicksilver, which is often found beneath the bottom rock."

When the reducing and amalgamating process is finished, the slime is washed off and the amalgam cleaned up, squeezed, and retorted.

NORWAY.

The production of gold in Norway is insignificant.

The production of silver from the Kongsberg silver mines from July 1, 1893, to June 30, 1894, which may be considered the output of 1894, was 4,705.3 kilograms, fine, of the coining value of $195,500.

PARAGUAY.

Gold was found in Paraguay in 1875, but on account of the poverty of the mines none have been worked.

PATAGONIA.

Alluvial gold in small quantities has been found in Patagonia in the water course in the neighborhood of Punta Arenas, on the Brunswick Peninsula.

PERU.

The gold product of Peru in 1894, estimated as equal to the exports of that metal from the Republic, was 111.655 kilograms, fine, of the value of $74,206. There was, however, as there is every year, some clandestine exportation, and this, therefore, represents only a portion of the gold product of the country.

The silver product of Peru in 1894 was made up of the following items:

	Kilograms, fine.
Deposited at the mint	107, 569. 213
Exported	100. 885
Total	107, 670. 098

of the coining value of $4,474,765, at which figure the output of silver in Peru in 1894 appears in this report.

Considering the decline of the price of silver in recent years, it is not a matter of surprise that mining of that metal has not been very profitable in Peru. The consequence of the depreciation of the white metal has been that a great many owners of small mines, the ores of which are not very rich, were obliged to close their works, while the possessors of larger mines and the mining companies endeavored, by improving the process of amalgamation and by the erection of smelters, to decrease the cost of production, and at the same time increase the output of the white metal, so that they might continue to operate without loss.

GOLD AND SILVER OUTPUT OF PERU.

[By Professor Hauchecorne.]

The production of the precious metals in Peru has declined greatly since the beginning of this century. While, according to Soetbeer, the production from 1801 to 1810 averaged 780 kilograms of gold annually and of silver 151,300 kilograms, for the years from 1880 to 1892 for which returns are to be had it was:

Year.	Gold.	Silver.
	Kilograms.	*Kilograms.*
1880	270	57,954
1884	180	45,909
1886	170	96,246
1888	158	75,263
1890	104	65,791
1892	113	74,879

According to this there was a steady decline in the production of gold until recently, while the production of silver increased to some extent.

The deposits of gold are partly alluvial deposits, of which those of Sandia and Carabaya, in the Department of Puno, have been worked for centuries. There are also quartz veins in San Thomas in the Department of Libertad, in the province of Union of the Department of Arequipa, and others. The mining of silver is carried on mainly in the celebrated beds of Cerro de Pasco, on the table-land of Junin. The Cerro de Pasco is a hard, thick layer in limestones, which is considered by some as belonging to the chalk formation and by others to the Jura formation. Finely divided silver ore is found in the limestone of the beds of the Cerro. The mining of the Cerro is carried on in an exceedingly primitive manner, being almost exclusively in the hands of beggarly mining companies and working owners. The ore is still carried out of the mines in bags. Besides the Cerro de Pasco there is also a number of lode-like deposits, which are being worked.

PHILIPPINE ISLANDS.

The occurrence of gold on the principal of the Philippine Islands, namely, Luzon, has been known since the end of the sixteenth century. According to a consular report of 1893 the alluvial gold beds of Luzon have produced, on an average, an annual product of the value of from 50,000 to 100,000 pesos.

The gold alluvions of Luzon are situated on the north coast of the southeastern peninsula, in the province of Camarines Norte.

There are also gold alluvions, which have been worked to some extent, on the northeastern part of the island of Mindanao.

A company organized in 1892, principally by English capitalists, under the name of the Philippine Mineral Syndicate, Limited, intends to work not only the alluvial gold, but also the gold in veins, on a large scale. It is said that the prospects of the undertaking are very favorable.

RUSSIA.

The following telegram was received August 2, 1895, from Mr. Breckinridge, United States minister at St. Petersburg, through the Department of State, in answer to an inquiry from this Bureau as to the production of gold and silver in Russia in the calendar year 1894:

> Gold, 36,312,752 grams and 586 thousandths; silver, 8,578,640 grams and 72 hundredths.

This would give a gold product of 1,167,455 ounces, fine, of the value of $24,133,437, representing 36,313 kilograms, and a silver product of 275,803 ounces, fine, of the coining value of $356,594, representing 8,580 kilograms.

These figures show a decrease in the product of gold in 1894, as compared with 1893, of $3,512,600 and of silver of $63,900.

SPAIN.

Spain produces no gold.

The production of silver in Spain in 1894 was, according to the information furnished this Bureau by United States minister to that country, Hon. Hannis Taylor, 63,605 kilograms, fine, of the coining value of $2,643,400, at which figures it appears in the table of the world's production of gold and silver in this report.

The Revista Minera[1] publishes the following statistics of the mineral and metallurgical production of Spain in 1894:

> *Silver.*—The Metallurgical Society of Mazarron has obtained, by the treatment of its leads, 33,000 kilograms of silver; the society of Pennaroya, 20,000 kilograms, and La Cruz of Linares, 60,000 kilograms.

This makes a total metallurgical production of silver in Spain in 1894 of 113,000 kilograms. The great difference between this metallurgical silver product of the country in 1894 and its mine production of silver in the same year, furnished by Minister Taylor, tends to show that Spain refines large quantities of silver ore not produced from its own mines, or else that much ore not mined in 1894 was refined in that year.

CONDITION OF THE LEAD-MINING INDUSTRY IN SPAIN.

[From the Board of Trade Journal, London, January, 1895.]

Sir H. Drummond Wolff, British ambassador at Madrid, in a dispatch to the foreign office, dated December 12 last, incloses the following translation from the Imparcial of December 11 of a bill brought into Congress for the relief of those engaged in the lead-mining industry in Spain:

The project of law for the removal of the present heavy duties on the lead-mining industry is to be discussed in Congress to-day, which is causing a severe crisis in that trade as affecting thousands of families whose means of subsistence is in imminent peril; and it is to be hoped that the courts will give to the question the attention it merits.

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[1] See London Board of Trade Journal, April, 1895, p. 406.

The following data will show the difficulties with which that industry has now to contend:

The last liquidation in the prices of silver and lead in the Cartagena market gave 10 pesetas per quintal for lead and 3 pesetas 25 centimes per ounce for silver, the lowest prices ever reached.

When the quintal of lead was at 15 to 20 pesetas and silver at 4 pesetas 50 centimes per ounce, the mining industry only paid 1 per cent taxes on the gross produce and the scale of bulk (canon de superficie) established by law. Now that prices have fallen so low, the tax on production has been raised to 2 per cent and the scale of bulk increased by 30 per cent. Leads and argentiferous galena pay 10 pesetas per ton export duty. Explosives, above all dynamite, which is necessary for working, have been taxed at a peseta per kilo, and to make matters worse the taxes on coal have likewise been raised. Hence the ruin which has fallen upon the mining districts of Spain and the abandonment within one year of 699 mining concessions in Murcia alone.

The smelting works, unequal to facing the crisis, have either closed or failed. Those with large resources, such as the Santa Elisa, of Mazarron, and some others of importance, have had to dismiss two-thirds of their workmen, and if the present state of things lasts until January the men now in work will be without it.

If the number of senators and deputies is insufficient to sanction the project of law the Christmas vacations will arrive without bringing succor to all those distressed people, and it will be hard for deputies, senators, and ministers to pass their vacation with a tranquil mind.

SUMATRA.

According to Professor Hauchecorne, alluvial gold has been found in Sumatra on the whole west coast of the island, which belongs, geologically, to a region characterized by old metamorphic schists. Gold quartz lodes which contain auriferous gravel have also been shown to exist there, but no output worth mentioning has as yet been obtained.

SWEDEN.

The gold product of Sweden in 1894 was 93.603 kilograms, fine, of the value of $62,208.

The silver product was 2,869 kilograms, fine, of the coining value of $119,235.

TURKEY.

This Bureau has received the following information relative to the gold and silver output of Turkey in 1894 from the Hon. A. W. Terrell, United States minister at Constantinople:

The output of gold and silver from the Government mines and refineries during the year 1894 was 11.535 kilograms, fine, of gold, which sold produced 1,672.57 Turkish pounds, and 1,516.456 kilograms, fine, of silver, which sold produced 6,562.39 Turkish pounds.

Outside the above-mentioned amounts, the mines of the country worked by private companies produced a large quantity of mineral ores.

The above weight corresponds in coining value in the United States, gold and silver, to $7,666 and $63,024, respectively, at which figures the gold and silver production of Turkey in 1894 appears in the table of the world's production in the present report.

URUGUAY.

Bankart demonstrated the existence of gold in Uruguay in 1867. He found in a region consisting of granite, Silurian beds, and quartzites on the Tacuarembo and Rio Grande rivers both alluvial gold and quartz lodes rich in the yellow metal.

In 1879 the occurrence was again investigated and the lodes worked, but without success. Not until 1885 was any output obtained by new workers.

The gold production of Uruguay, according to Professor Hauchecorne, has been as follows:

Year.	Quantity.	Year.	Quantity.
	Kilograms.		*Kilograms.*
1885	64	1889	139
1886	65	1890	187
1887	64	1891	140
1888	26	1892	160

VENEZUELA.

According to the official returns the gold product of Venezuela in 1894 amounted to 1,859¼ kilograms, of the value of 4,412,410 bolivars, or $851,595.13, representing 1,281 kilograms, fine; at which figure it appears in the table of the world's output of gold and silver in this report.

THE GOLD MINES OF VENEZUELA.

[By Professor Hauchecorne.]

The production of gold in Venezuela began in 1849, in which year gold was discovered in the upper course of the Yuruari River in the vicinity of Nueva Procidencia. The gold product of Venezuela, however, comes, and has for a long time come, chiefly from the mines of the El Callao, southeast of Bolivar, on the southern shore of the Orinoco. Here a gold quartz lode from 1½ to 3 meters, or 4.90 to 9.80 feet, in thickness is found in diorite rock inclosed in crystallic layers, and which for a time produced a large amount of gold. It contains the gold mostly in the form of free gold, but a small amount in gravel. Among other lodes worked is a mass of ore 200 meters in length, with an average gold content of 1.1 ounces per ton, but rising in places to 8 ounces per ton. These mines have been worked to a depth of 220 meters (719 feet). There is danger that after the working of the mass just referred to operations on this mine may be arrested, because the remaining part of the lode possesses no other paying mass. But new mines have been opened in the neighborhood which seem to guarantee a continuance of lode mining in the district known as the Caratal field.

Besides vein mining, a large quantity of gold is washed in the district south and east of the Caratal district as far as Cuyuni and the western border of British Guiana, called the alluvial gold field of Yuruari. The quantity of gold obtained from this alluvial gold field is estimated at from 8,000 to 10,000 ounces per month, or 3,000 to 3,700 kilograms per annum.

The gold obtained in this district is exported by way of Georgetown in British Guiana. Apart from the gold output of this latter district the gold production of Venezuela from the Caratal field amounted to:

Year.	Quantity.	Year.	Quantity.
	Kilograms.		*Kilograms.*
1880	3,634	1890	2,512
1884	7,278	1891	1,504
1886	7,272	1892	2,000
1888	2,344		

PART III.

GENERAL STATISTICS.

I.—DEPOSITS AND PURCHASES OF GOLD AND SILVER, BY WEIGHT,

Description of deposit.	COINAGE MINTS.			
	Philadelphia.	San Francisco.	Carson.	New Orleans.
GOLD.	*Ozs., standard.*	*Ozs., standard.*	*Ozs.,standard*	*Ozs..standard*
Domestic bullion, unrefined	4, 191. 073	218, 178. 712	49, 280. 965	448. 884
Domestic bullion, refined	33, 168. 041	750, 129. 286	....	....
Domestic coin, transferred from Treasury	31, 653. 760	156. 980	....	238. 250
Domestic coin, mutilated and abraded	9, 286. 748	456. 236	....	993. 331
Foreign bullion, unrefined	1, 808. 861	19. 225. 374	....	6, 857. 740
Foreign bullion, refined	5. 128	12, 808. 462	....	....
Foreign coin melted	12. 906	34, 226. 421	....	111. 309
Jewelers' bars, old plate, etc	47, 169. 759	1, 537. 152	....	3, 410. 661
Total deposits	127, 296. 276	1, 036, 718. 623	49, 280. 965	12, 060. 175
Redeposits:				
Fine bars	2, 155. 907 000	41, 539. 088	....	....
Unparted bars	477, 270. 460	....	....	....
Total gold received	2, 760, 473. 736	1, 078, 257. 711	49, 280. 965	12, 060. 175
SILVER.				
Domestic bullion, unrefined	2, 503. 47	36, 702. 68	445, 026. 60	10. 61
Domestic bullion, refined	7, 682. 23	....	....	....
Domestic coin, transferred from Treasury	934, 947. 04	2, 215, 757. 85	....	1, 334, 389. 02
Domestic coin, worn and uncurrent	2, 220. 78	82. 20	....	1, 057. 16
Trade dollars, uncurrent	145. 41	....	....	6. 94
Foreign bullion, unrefined	2, 051. 16	4, 672. 32	....	346. 20
Foreign coin melted	....	2. 03	....	....
Jewelers' bars, old plate, etc	52, 269. 08	443. 94	....	2, 520. 39
Total deposits	1, 001, 819. 17	2, 257, 661. 02	445, 026. 60	1, 338, 330. 32
Redeposits:				
Fine bars	85, 004. 58	....	1, 636. 95	....
Unparted bars	86, 198. 22	....	....	....
Total silver received	1, 173, 021. 97	2, 257, 661. 02	446, 663. 55	1, 338, 330. 32
Gold and silver deposits and purchases.	1, 129, 115. 446	3, 294, 379. 643	494, 307. 565	1, 350, 390. 495
Redeposits:				
Gold	2, 633, 177. 460	41, 539. 088	....	....
Silver	171, 202. 80	....	1, 636. 95	....
Total gold and silver received	3, 933, 495. 706	3, 335, 918. 731	495, 944. 515	1, 350, 390. 495

DURING THE CALENDAR YEAR ENDED DECEMBER 31, 1894.

ASSAY OFFICES.						Total.
New York.	Denver.	Boise.	Helena.	Charlotte.	St. Louis.	
Ozs., standard	*Ozs., standard*	*Ozs., standard*	*Ozs., standard*	*Ozs standard*	*Ozs., standard*	*Ozs., standard.*
214, 792. 148	123, 271. 414	43, 268. 311	113, 806. 544	11, 806. 294	2, 887. 723	781, 932. 068
461, 017. 688	177, 460. 006	....	....	....	....	1 421, 775. 021
....	....	....	....	....	....	32, 048 990
23, 293. 484	37. 640	....	....	....	2. 533. 732	36, 601. 171
95, 839. 267	....	....	516. 657	....	971. 917	125, 219. 816
288. 131	....	....	....	....	....	13, 101. 721
62, 043. 465	....	....	....	....	11. 455	96, 405. 556
107, 479. 410	994. 856	....	47. 796	334. 589	3, 579. 908	164, 554. 131
964, 753. 593	301, 763. 916	43, 268. 311	114, 370. 997	12, 140. 883	9, 984. 735	2, 671, 638. 474
239. 893	....	....	....	....	....	2, 197, 685. 981
367. 010	146. 505	9, 770. 159	406. 660	....	....	487, 960. 794
965, 360. 496	301, 910. 421	53, 038. 470	114, 777. 657	12, 140. 883	9, 984. 735	5, 357, 285. 249
811, 426. 00	34, 155. 39	11, 081. 19	36, 706. 60	971. 15	427. 60	1, 379, 011. 29
4, 561, 717. 59	2, 166. 68	....	....	....	....	4, 571, 566. 50
....	....	....	....	....	....	4, 485, 093. 91
3, 733. 08	....	....	....	....	3. 94	7, 097. 16
126. 17	....	....	....	....	....	278. 52
1, 112, 152. 51	....	....	303. 13	....	193. 52	1, 119, 718. 84
18, 539. 88	....	....	....	....	....	18, 541. 91
496, 718. 09	288. 93	....	14. 45	124. 52	1, 207. 62	553, 587. 02
7, 004, 413. 32	36, 611. 00	11, 081. 19	37, 024. 18	1, 095. 67	1, 832. 68	12, 134, 895. 15
17, 288. 70	....	....	....	....	....	103, 930. 23
887. 55	65. 80	2, 189. 92	262. 46	....	....	89, 603. 95
7, 022, 589. 57	36, 676. 80	13, 271. 11	37, 286. 64	1, 095. 67	1, 832. 68	12, 328, 429. 33
7, 969, 166. 913	338, 374. 916	54, 349. 501	151, 395. 177	13, 236. 553	11, 817. 415	14, 806, 533. 624
606. 903	146. 505	9, 770. 159	406. 660	....	....	2, 685, 646. 775
18. 176. 25	65. 80	2, 189. 92	262. 46	....	....	193, 534. 18
7, 987, 950. 066	338. 587. 221	66, 309. 580	152, 064. 297	13, 236. 553	11, 817. 415	17, 685, 714. 579

II.—Deposits and Purchases of Gold and Silver, by Value,

Description of deposit.	COINAGE MINTS.			
	Philadelphia.	San Francisco.	Carson.	New Orleans.
GOLD.				
Domestic bullion, unrefined	$77,973.45	$4.059,138.83	$916.855.16	$8,351.32
Domestic bullion, refined	617,079.83	13,955,893.69	....	....
Domestic coin, transferred from Treasury	588,907.15	2,920.56	....	4,432.56
Domestic coin, mutilated and abraded, deposited	172,776.71	8,488.11	....	18.480 57
Foreign bullion, unrefined	33,653.23	357,681.37	....	127,585.86
Foreign bullion, refined	95.41	238.296.97	....	....
Foreign coin melted	240.12	636.770.62	....	2,070.87
Jewelers' bars, old plate, etc	877,576.91	28.598.18	....	63,454.16
Total deposits	2,368,302.81	19,287,788.33	916,855.16	224,375.34
Redeposits:				
Fine bars	40,109.897.68	772.820.24	....	....
Unparted bars	8.879.450.41	....	....	....
Total gold received	51,357,650.90	20,060,608.57	916,855.16	224,375.34
SILVER.				
Domestic bullion, unrefined	2,913.13	42,708.57	517,849.13	12.34
Domestic bullion, refined	8,939.32	....	....	....
Domestic coin, transferred from Treasury	1,087,938.37	2,578,336.39	....	1.552.743.58
Domestic coin, worn and uncurrent, deposited	2,584.18	95.65	....	1,230.15
Trade dollars, uncurrent, deposited	169.21	....	....	8.09
Foreign bullion, unrefined	2.386.81	5,436.88	....	402.85
Foreign coin melted	....	2.36	....	....
Jewelers' bars, old plate, etc	60,822.20	516.58	....	2,932.82
Total deposits	1,165,753.22	2,627,096.43	517,849.13	1,557,329.83
Redeposits:				
Fine bars	98,914.42	....	1,904.81	....
Unparted bars	100,303.38	....	....	....
Total silver received	1,364,971.02	2,627,096.43	519,753.94	1,557,329.83
Gold and silver deposits and purchases	3,534,056.03	21,914,884.76	1,434,704.29	1,781,705.17
Redeposits:				
Gold	48,989,348.09	772,820.24	....	....
Silver	199,217.80	....	1,904.81	....
Total gold and silver received	52,722,621.92	22,687,705.00	1,436,609.10	1,781,705.17

DURING THE CALENDAR YEAR ENDED DECEMBER 31, 1894.

ASSAY OFFICES.						Total.
New York.	Denver.	Boise.	Helena.	Charlotte.	St. Louis.	
$3,996,132.98	$2,293,421.65	$804,991.83	$2,117,331.05	$219,651.98	$53,725 08	$14,547,573.33
8,577,073.28	3,301,581.51	....	....	....	....	26,451,628.31
....	....	....	....	....	....	596,260.27
433,367.15	700.28	....	....	....	47,139.19	680,952.01
1,783,056.13	....	....	9,612.22	....	18,082.18	2,329,670.99
5,360.58	....	....	....	....	....	243,752.96
1,154,297.02	....	....	....	....	213.11	1,793,591.74
1,999,616.92	18,508.95	....	889.23	6,224.91	66,602.94	3,061,472.20
17,948,904.06	5,614,212.39	804,991.83	2,127,832.50	225,876.89	185,762.50	49,704,901.81
4,463.12	....	....	....	....	....	40,887,181.04
6,828.09	2,725.67	181,770.40	7,565.77	....	....	9,078,340.34
17,960,195.27	5,616,938.06	986,762.23	2,135,398.27	225,876.89	185,762.50	99,670,423.19
944,204.80	39,744.44	12,894.47	42.713.13	1,130.06	497.57	1,604,667.64
5,308,180.47	2,521.23	....	....	....	....	5,319,641.02
....	....	....	....	....	....	5,219,018.34
4,343.95	....	....	....	....	4.58	8,258.51
146.81	....	....	....	....	....	324.11
1,294,141.10	....	....	352.73	....	225.19	1,302,945.56
21,573.68	....	....	....	....	....	21,576.04
577,999.23	336.21	....	16.81	144.90	1,405.22	644,173.97
8,150,590.04	42,601.88	12,894.47	43,082.67	1,274.96	2,132.56	14,120,605.19
20,117.76	....	....	....	....	....	120,936.99
1,032.79	76.56	2,548.26	305.41	....	....	104,266.40
8,171,740.59	42,678.44	15,442.73	43,388.08	1,274.96	2,132.56	14,345,808.58
26,099,494.10	5,656,814.27	817,886.30	2,170,915.17	227,151.85	187,895.06	63,825,507.00
11,291.21	2,725.67	181,770.40	7,565.77	....	....	49,965,521.38
21,150.55	76.56	2,548.26	305.41	....	....	225,203.39
26,131,935.86	5,659,616.50	1,002,204.96	2,178,786.35	227,151.85	187,895.06	114,016,231 77

III.—Deposits of Unrefined Gold of Domestic Production, with the States Distributed, by Weight, during the

Source.	Coinage mints.			
	Philadelphia.	San Francisco.	Carson.	New Orleans.
	Ozs. standard.	*Ozs., standard.*	*Ozs., standard.*	*Ozs., standard.*
Alabama	40.433			76.062
Alaska		14,251.369		
Arizona	87.238	26,281.980		71.657
California	245.549	145,043.531	15,358.431	
Colorado	391.902	5.257		
Georgia	346.692			5.445
Idaho	95.545	4,766.383		29.295
Iowa	6.213			
Maine	13.585			
Michigan				
Minnesota	266.281			
Missouri				4.451
Montana	198.329	517.812		
Nevada	185.872	3,822.034	33,922.534	
New Mexico	41.357	310.854		29.512
North Carolina	400.491			
Oregon	4.092	11,561.689		
South Carolina	134.663			
South Dakota	420.610			
Tennessee	4.922			
Texas				232.462
Utah		7,255.457		
Vermont	8.504			
Virginia	287.608			
Washington		4,352.278		
Wisconsin	17.508			
Wyoming	371.832			
Other sources	621.847	10.068		
Total unrefined gold	4,191.073	218,178.712	49,280.965	448.884
Refined gold	33,168.041	750,129.286		
Total gold	37,359.114	968,307.998	49,280.965	448.884

AND TERRITORIES PRODUCING THE SAME, AND OF REFINED DOMESTIC BULLION NOT
CALENDAR YEAR ENDED DECEMBER 31, 1894.

ASSAY OFFICES.						Total.
New York.	Denver.	Boise.	Helena.	Charlotte.	St. Louis.	
Ozs., standard	*Ozs., standard*	*Ozs., standard*	*Ozs., standard*	*Ozs., standard*	*Ozs., standard*	*Ozs., standard.*
....	....	....	....	64.255	....	180.750
....	141.341	....	74.983	....	....	14,467.693
1,170.893	9,232.191	....	....	....	157.351	37,001.310
171.663	1,750.564	....	....	....	....	162,569.738
8,077.255	95,859.487	....	....	....	316.783	104,650.684
16.383	....	....	....	4,805.249	80.103	5,253.872
331.750	878.546	29,073.395	7,430.693	....	....	42,605.607
....	....	....	....	....	....	6.213
....	....	....	....	....	....	13.585
1,934.017	....	....	....	....	....	1,934.017
....	....	....	....	....	....	266.281
....	....	....	....	....	....	4.451
15,805.965	73.362	....	103,997.947	....	....	120,593.415
49.018	3,045.605	....	....	....	....	41,025.063
9,882.311	9,481.857	....	....	....	2,286.401	22,032.292
291,630	....	....	....	1,812.223	....	2,504.344
....	19.615	14,190.278	....	....	....	25,775.674
....	....	....	....	5,124.567	....	5,259.230
165,727.239	882.762	....	....	....	42.807	167,073.418
7.359	....	....	....	....	....	12.281
....	....	....	....	....	....	232.462
492.410	1,135.726	....	....	....	....	8,883.593
....	....	....	....	....	....	8.504
....	....	....	....	....	....	287.608
....	10.245	4.638	2,290.782	....	....	6,657.943
....	....	....	....	....	....	17.508
27.150	760.113	....	12.139	....	....	1,171.234
10,807.105	....	....	....	....	4.278	11,443.298
214,792.148	123,271.414	43,268.311	113,806.544	11,806.294	2.887.723	781,932.068
461,017.688	177,460.006	....	....	....	....	1,421,775.021
675,809.836	300,731.420	43,268.311	113,806.544	11,806.294	2,887.723	2,203,707.089

IV.—DEPOSITS OF UNREFINED GOLD OF DOMESTIC PRODUCTION, WITH THE STATES DISTRIBUTED, BY VALUE, DURING THE

Source.	COINAGE MINTS.			
	Philadelphia.	San Francisco.	Carson.	New Orleans.
Alabama	$752.24			$1,415.11
Alaska		$265,141.75		
Arizona	1.623.03	488,967.07		1,333.15
California	4,568.35	2,698 484.30	$285,738.25	
Colorado	7,291.20	97.80		
Georgia	6,450.08			101.30
Idaho	1,777.58	88,676.89		545.02
Iowa	115.59			
Maine	252.75			
Michigan				
Minnesota	4,954.07			
Missouri				82.81
Montana	3,689.84	9,633.71		
Nevada	3,458.08	71,107.61	631.116.91	
New Mexico	769.43	5,783.33		549.06
North Carolina	7,451.00			
Oregon	76.13	215,101.19		
South Carolina	2,505.36			
South Dakota	7,825.30			
Tennessee	91.57			
Texas				4,324.87
Utah		134,985.25		
Vermont	158.21			
Virginia	5,350.85			
Washington		80,972.62		
Wisconsin	325.73			
Wyoming	6,917.81			
Other sources	11,569.25	187.31		
Total unrefined gold	77,973.45	4,059,138.83	916,855.16	8,351.32
Refined gold	617,079.83	13,955,893.69		
Total gold	695,053.28	18,015,032.52	916,855.16	8.351.32

AND TERRITORIES PRODUCING THE SAME, AND OF REFINED DOMESTIC BULLION NOT CALENDAR YEAR ENDED DECEMBER 31, 1894.

ASSAY OFFICES.						Total.
New York.	Denver.	Boise.	Helena.	Charlotte.	St. Louis.	
....	....	....	....	$1,195.44	....	$3,362.79
....	$2,629.60	....	$1,395.03	....	....	269,166.38
$21,784.05	171,761 69	....	....	....	$2,927.46	688,396.45
3,193.73	32,568.63	....	....	....	....	3,024,553.26
150,274.51	1.783.432.32	....	....	....	5,893.64	1,946,989.47
304.80	....	....	....	89,399.98	1,490.29	97.746.45
6,172.09	16,345 04	$540,900.37	138,245.45	....	....	792,662.44
....	....	....	....	....	....	115.59
....	....	....	....	....	....	252.75
35,981.71	....	....	....	....	....	35,981.71
....	....	....	....	....	....	4,954.07
....	....	....	....	....	....	82.81
294,064.47	1,364.87	....	1,934,845.53	....	....	2,243,598.42
911.96	56,662.42	....	....	....	....	763,256.98
183,856.95	176,406.64	....	....	....	42,537.69	409,903.10
5,425.67	....	....	....	33,715.78	....	46,592.45
....	364.93	264,005.17	....	....	....	479,547.42
....	....	....	....	95,340.78	....	97,846.14
3,083,297.47	....	....	....	....	796.41	3,091,919.18
136.91	16,423.48	....	....	....	....	16,651.96
....	....	....	....	....	....	4,324.87
9,161.12	21,129.78	....	....	....	....	165,276.15
....	....	....	....	....	....	158.21
....	....	....	....	....	....	5,350.85
....	190.61	86.29	42,619.20	....	....	123,868.72
....	....	....	....	....	....	325.73
505.12	14,141.64	....	225.84	....	....	21,790.41
201,062.42	....	....	....	....	79.59	212,898.57
3,996,132.98	2,293,421.65	804,991.83	2,117,331.05	219,651.98	53,725 08	14,547,573.33
8,577,073.28	3,301,581.51	....	....	....	....	26,451,628.31
12,573,206.26	5,595,003.16	804,991.83	2,117,331.05	219,651.98	53,725.08	40 999.201 64

V.—Deposits of Unrefined Silver of Domestic Production, with the States Distributed, by Weight, during the

Source.	Coinage mints.			
	Philadelphia.	San Francisco.	Carson.	New Orleans.
	Ozs., standard.	*Ozs., standard.*	*Ozs., standard.*	*Ozs., standard.*
Alabama	15.98			
Alaska		2,657.16		
Arizona	17.44	7,195.64		1.25
California	41.01	20,577.18	19,806.64	
Colorado	41.16	2.50		
Georgia	22.09			
Idaho	27.46	1,213.66		6.34
Iowa	1.19			
Maine	.76			
Michigan	1,849.59			
Minnesota	54.49			
Montana	11.73	63.14		
Nevada	119.22	1,248.43	425,219.96	
New Mexico	13.43	104.68		
North Carolina	62.12			
Oregon	2.04	1,602.87		
South Carolina	32.32			
South Dakota	33.03			
Tennessee	.70			
Texas				3.02
Utah		1,330.31		
Vermont	.25			
Virginia	16.89			
Washington		704.45		
Wisconsin	6.03			
Wyoming	57.59			
Other sources	76.95	2.66		
Total unrefined silver	2,503.47	36,702.68	445,026.60	10.61
Refined silver	7,682.23			
Total silver	10,185.70	36,702.68	445,026.60	10.61

and Territories producing the same, and of Refined Domestic Bullion not Calendar Year ended December 31, 1894.

Assay offices.						Total.
New York.	Denver.	Boise.	Helena.	Charlotte.	St. Louis.	
Ozs., standard	*Ozs., standard*	*Ozs., standard*	*Ozs., standard*	*Ozs., standard*	*Ozs., standard*	*Ozs., standard.*
....	....	....	....	22. 20	....	38. 18
....	17. 86	....	15. 37	....	....	2, 690. 39
459. 62	3, 227. 30	....	....	....	44. 98	10, 946. 23
43. 79	543. 90	....	....	....	....	41, 012. 52
59, 672. 46	28, 160. 85	....	....	....	38. 53	87, 915. 50
1. 26	....	....	....	337. 34	....	360. 69
451. 96	125. 12	8, 347. 21	1, 791. 08	....	....	11, 962. 83
....	....	....	....	....	....	1. 19
....	....	....	....	....	....	.76
34, 296. 03	....	....	....	....	....	36, 145. 62
....	....	....	....	....	....	54. 49
401, 598. 78	3. 87	....	33, 995. 26	....	....	435, 672. 78
27. 30	279. 51	....	....	....	....	426, 894. 42
187, 120. 62	1, 432. 77	....	....	....	281. 43	188, 952. 93
23. 39	....	....	....	305. 35	....	390. 86
....	4. 65	2, 732. 56	....	....	....	4, 342. 12
....	....	....	....	306. 26	....	338. 58
27, 835. 42	91. 34	....	....	....	7. 12	27, 966. 91
....	....	....	....	....	....	.70
....	....	....	....	....	....	3. 02
5, 688. 26	180. 49	....	....	....	....	7, 199. 06
....	....	....	....	....	....	.25
....	....	....	....	....	....	16. 89
....	1. 18	1. 42	904. 08	....	....	1, 611. 13
....	....	....	....	....	....	6. 03
1. 83	86. 55	....	.81	....	....	146. 78
94, 205. 28	....	....	....	....	55. 54	94, 340. 43
811, 426. 00	34, 155. 39	11, 081. 19	36, 706. 60	971. 15	427. 60	1, 379, 011. 29
4, 561, 717. 59	2, 166. 68	....	....	....	....	4, 571, 566. 50
5, 373, 143. 59	36, 322. 07	11, 081. 19	36, 706. 60	971. 15	427. 60	5, 950, 577. 79

VI.—DEPOSITS OF UNREFINED SILVER OF DOMESTIC PRODUCTION, WITH THE STATES DISTRIBUTED, BY VALUE, DURING THE

Source.	COINAGE MINTS.			
	Philadelphia.	San Francisco.	Carson.	New Orleans.
Alabama	$18.60			
Alaska		$3,091.97		
Arizona	20.29	8,373.11		$1.45
California	47.72	23,944.35	$23,047.73	
Colorado	47.90	2.91		
Georgia	25.70			
Idaho	31.95	1,412.26		7.38
Iowa	1.38			
Maine	.88			
Michigan	2,152.25			
Minnesota	63.41			
Montana	13.65	73.47		
Nevada	138.73	1,452.72	494,801.40	
New Mexico	15.63	121.81		
North Carolina	72.29			
Oregon	2.37	1,865.16		
South Carolina	37.61			
South Dakota	38.44			
Tennessee	.82			
Texas				3.51
Utah		1,548.00		
Vermont	.29			
Virginia	19.65			
Washington		819.72		
Wisconsin	7.02			
Wyoming	67.01			
Other sources	89.54	3.09		
Total unrefined silver	2,913.13	42,708.57	517,849.13	12.34
Refined silver	8,939.32			
Total silver	11,852.45	42,708.57	517,849.13	12.34

and Territories producing the same, and of Refined Domestic Bullion not
Calendar Year ended December 31, 1891.

Assay offices.						Total.
New York.	Denver.	Boise.	Helena.	Charlotte.	St. Louis.	
....	....	....	....	$25.83	....	$44.43
....	$20.78	....	$17.88	....	....	3,130.63
$534.83	3,755.40	....	....	....	$52.34	12,737.42
50.95	632.90	....	....	....	....	47,723.65
69,437.04	32,768.99	....	....	....	44.83	102,301.67
1.47	....	....	....	392.54	....	419.71
525.92	145.59	$9,713.12	2,084.17	....	....	13,920.39
....	....	....	....	....	....	1.38
....	....	....	....	....	....	.88
39,908.11	....	....	....	....	....	42,060.36
....	....	....	....	....	....	63.41
467,314.94	4.50	....	39,558.12	....	....	506,964.68
31.77	325.25	....	....	....	....	496,749.87
217,740.36	1,667.22	....	....	....	327.48	219,872.50
27.22	....	....	....	355.32	....	454.83
....	5.41	3,179.70	....	....	....	5,052.64
....	....	....	....	356.37	....	393.98
32,390.31	106.29	....	....	....	8.29	32,543.33
....	....	....	....	....	....	.82
....	....	....	....	....	....	3.51
6,619.06	210.03	....	....	....	....	8,377.09
....	....	....	....	....	....	.29
....	....	....	....	....	....	19.65
....	1.37	1.65	1,052.02	....	....	1,874.76
....	....	....	....	....	....	7.02
2.13	100.71	....	.94	....	....	170.79
109,620.69	....	....	....	....	64.63	109,777.95
944,204.80	39,744.44	12,894.47	42,713.13	1,130.06	497.57	1,604,667.64
5,308,180.47	2,521.23	....	....	....	....	5,319,641.02
6,252,385.27	42,265.67	12,894.47	42,713.13	1,130.06	497.57	6,924,308.66

VII.—BARS MANUFACTURED OF GOLD AND SILVER, BY WEIGHT,

Description.	COINAGE MINTS.			
	Philadelphia.	San Francisco.	Carson.	New Orleans.
GOLD.	*Ozs., standard.*	*Ozs., standard.*	*Ozs., standard.*	*Ozs., standard.*
Fine bars	45, 737. 143	...	39, 419. 712	50. 593
Mint bars	2, 968. 450	...	...	...
Standard bars	...	...	...	...
Unparted bars	...	...	...	...
Total gold	48, 705. 593	...	39, 419. 712	50. 593
SILVER.				
Fine bars	47, 329. 37	849. 40	443, 845. 83	407. 33
Mint bars	...	...	...	...
Standard bars	...	...	...	...
Unparted bars	...	...	...	...
Total silver	47, 329. 37	849. 40	443, 845. 83	407. 33

VIII.—BARS MANUFACTURED OF GOLD AND SILVER, BY VALUE,

Description.	COINAGE MINTS.			
	Philadelphia.	San Francisco.	Carson.	New Orleans.
GOLD.				
Fine bars	$850, 923. 59	...	$733, 389. 99	$941. 26
Mint bars	55, 226. 98	...	...	...
Standard bars	...	...	...	...
Unparted bars	...	...	...	...
Total gold	906, 150. 57	...	733, 389. 99	941. 26
SILVER.				
Fine bars	55, 074. 17	$988. 39	516, 475. 14	473. 98
Mint bars	...	...	...	...
Standard bars	...	...	...	...
Unparted bars	...	...	...	...
Total silver	55, 074. 17	988. 39	516 475. 14	473. 98
Total value of gold and silver bars	961, 224. 74	988. 39	1, 249, 865. 13	1, 415. 24

DURING THE CALENDAR YEAR ENDED DECEMBER 31, 1894.

ASSAY OFFICES.						Total.
New York.	Denver.	Boise.	Helena.	Charlotte.	St. Louis.	
Ozs., standard.	*Ozs.,standard*	*Ozs. standard*	*Ozs. standard*	*Ozs.,standard*	*Ozs. standard*	*Ozs.,standard*
846, 407. 200	108, 823. 522	....	....	....	....	1, 040, 438. 170
110, 949. 786	....	....	....	....	....	113, 918. 236
....	....	....	....	....	....	....
1, 853. 747	193, 086. 899	53, 038. 470	114, 777. 657	12, 140. 883	9, 984. 735	384, 882. 391
959, 210. 733	301, 910. 421	53, 038. 470	114, 777. 657	12, 140. 883	9, 984. 735	1, 539, 238. 797
6, 632, 328. 56	....	....	....	....	....	7, 124, 760. 49
85, 004. 58	....	....	....	....	....	85, 004. 58
9, 832. 84	....	....	....	....	....	9, 832. 84
266, 424. 16	36, 676. 80	13, 271. 11	37, 286. 64	1, 095. 67	1, 832. 68	356, 587. 06
6, 993, 590. 14	36, 676. 80	13, 271. 11	37, 286. 64	1, 095. 67	1, 832. 68	7, 576, 184. 97

DURING THE CALENDAR YEAR ENDED DECEMBER 31, 1894.

ASSAY OFFICES.						Total.
New York	Denver.	Boise.	Helena.	Charlotte.	St. Louis.	
$15, 747, 110. 69	$2, 024. 623. 66	....	....	....	....	$19, 356, 989. 19
2, 064, 182. 07	....	....	....	....	....	2, 119, 409. 05
....	....	....	....	....	....	....
34, 488. 32	3, 592, 314. 40	$986, 762. 23	$2, 135, 398. 27	$225, 876. 89	$185, 762. 50	7, 160, 602. 61
17, 845, 781. 08	5, 616, 938. 06	986, 762. 23	2, 135, 398. 27	225, 876. 89	185, 762. 50	28, 637, 000. 85
7, 717, 618. 69	....	....	....	....	....	8, 290, 630. 37
98, 914. 42	....	....	....	....	....	98, 914. 42
11, 441. 85	....	....	....	....	....	11, 441. 85
310, 020. 84	42, 678. 44	15, 442. 73	43, 388. 08	1, 274. 96	2, 132. 56	414, 937. 61
8, 137, 995. 80	42, 678. 44	15, 442. 73	43, 383. 08	1, 274. 96	2, 132. 56	8, 815, 924. 25
25, 983, 776. 88	5, 659, 616. 50	1, 002, 204. 96	2, 178, 786. 35	227, 151. 85	187, 895. 06	37, 452, 925. 10

IX.—Statement of Domestic Mutilated and Uncurrent Gold and Silver for Recoinage, showing Weight, Face Value, Coining Value,

Denomination.	PHILADELPHIA.		SAN FRANCISCO.	
	Received from Treasury.	Purchased.	Received from Treasury.	Purchased.
GOLD.				
Double eagles	$198, 680. 00	$100, 120. 00	$1, 010. 00	$6, 120. 00
Eagles	72, 260. 00	29, 660. 00	1, 945. 00	1, 140. 00
Half eagles	87, 225. 00	40, 580. 00		2, 245. 00
Three-dollar pieces	138, 600. 00	87. 00		18. 00
Quarter eagles	94, 672. 50	3, 540. 00		315. 00
Dollars	2. 00	190. 00		83. 00
Total gold, face value	591, 439. 50	174, 177. 00	2, 955. 00	9, 921. 00
SILVER.				
Trade dollars		167. 00		
Standard dollars	3, 600. 00	633. 00		
Half dollars	336, 583. 00	557. 50	2, 310, 500. 00	66. 00
Half dollars, Columbian		943. 00		
Quarter dollars	591, 705. 00	604. 00	299, 000. 00	17. 50
Quarter dollars, Columbian	3, 952. 25			
Twenty-cent pieces	469. 20		44. 20	
Dimes	294, 670. 00	290. 80	205, 230. 00	25. 90
Half dimes	4, 480. 40	112. 75	1, 396. 35	6. 25
Three-cent pieces	216. 27	2. 07	4. 95	
Total silver, face value	1, 235, 676. 12	3, 310. 12	2, 816, 175. 50	115. 65
SUMMARY.	*Ozs., fine.*	*Ozs., fine.*	*Ozs., fine.*	*Ozs., fine.*
Gold	28, 498. 384	8, 358. 073	141. 282	410. 613
Silver	841, 452. 33	1, 998. 70	1, 994, 182. 06	73. 98
Gold, coining value	$588, 907. 15	$172, 776. 71	$2, 920. 56	$8, 488. 11
Silver, subsidiary, coining value	1, 163, 231. 15	2, 943. 93	2, 756, 774. 90	102. 27
Silver, dollar, coining value	1, 087, 938. 37	2, 753. 39	2, 578, 336. 39	95. 65
Loss, gold	2, 532. 35	1, 400. 29	34. 44	1, 432. 89
Loss, silver, subsidiary	72, 444. 97	366. 19	59, 400. 60	13. 38

COINS TRANSFERRED FROM THE TREASURY AND PURCHASED OVER THE COUNTER AND LOSS DURING THE CALENDAR YEAR ENDED DECEMBER 31, 1894.

NEW ORLEANS.		NEW YORK.	DENVER.	ST. LOUIS.	Total.		
Received from Treasury.	Purchased.	Purchased.	Purchased.	Purchased.	Received from Treasury.	Purchased.	Received from Treasury and purchased.
$420 00	$1, 940. 00	$93, 960. 00	$600. 00	$27, 060. 00	$200, 110. 00	$229, 800. 00	$429, 910. 00
480. 00	2, 400. 00	178, 570. 00	70. 00	10, 820. 00	74, 685. 00	222, 660. 00	297, 345. 00
1, 130. 00	13, 310. 00	142, 025. 00	35. 00	9, 385. 00	88, 355. 00	207, 580. 00	295, 935. 00
2. 400. 00	6. 00	138. 00	....	3. 00	141, 000. 00	252. 00	141, 252. 00
20. 00	1, 004. 50	23, 202. 50	....	297. 50	94, 692. 50	28, 359. 50	123, 052. 00
....	24. 00	535. 00	....	18. 00	2. 00	850. 00	852. 00
4, 450. 00	18, 684. 50	438, 430. 50	705. 00	47, 583. 50	598, 844. 50	689, 501. 50	1, 288, 346. 00
....	8. 00	148. 00	....	....	....	323. 00	323. 00
10, 499. 00	238. 00	308. 00	....	....	14, 099. 00	1, 179. 00	15, 278. 00
956, 844. 50	699. 50	1, 417. 00	....	....	3, 603, 927. 50	2, 740. 00	3, 606, 667. 50
....	....	....	....	....	....	943. 00	943. 00
592, 385. 50	293. 75	1, 424. 25	....	5. 25	1, 483, 090. 50	2, 344. 75	1, 485, 435. 25
....	....	....	....	....	3, 952. 25	....	3, 952. 25
248. 20	1. 80	....	....	....	761. 60	1. 80	763. 40
177, 331. 80	90. 20	1, 561. 20	....	....	677, 231. 80	1, 968. 10	679, 199. 90
671. 15	13. 45	32. 15	....	....	6, 547. 90	164. 60	6, 712. 50
40. 68	1. 77	....	....	....	261. 90	3. 84	265. 74
1, 738, 020. 83	1, 346. 47	4, 890. 60	....	5. 25	5, 789, 872. 45	9, 668. 09	5, 799, 540. 54
Ozs., fine.	*Ozs., fine.*	*Ozs., fine.*	*Ozs., fine.*	*Ozs., fine.*	*Ozs., fine.*	*Ozs., fine.*	*Ozs., fine.*
214. 425	893. 998	20, 964. 135	133. 876	2, 280. 359	28, 854. 091	32, 941. 054	61, 795. 145
1,200,950.12	951. 44	3, 359. 78	....	3. 55	4,036,584.51	6, 387. 45	4, 042, 971. 96
$4, 432. 56	$18, 480. 57	$433, 367. 15	$700. 28	$47, 139. 19	$596, 260. 27	$680, 952. 01	$1, 277, 212. 28
1, 660, 204. 05	1, 323. 91	4, 801. 55	....	4. 90	5, 580, 210. 10	9, 176. 57	5, 589, 386. 66
1, 552, 743. 58	1, 238. 24	....	....	4. 58	5, 219, 018. 34	8, 582. 62	5, 227, 600. 96
17. 44	203. 93	5, 063. 35	4. 72	444. 31	2, 584. 23	8, 549. 49	11, 133. 72
77, 816. 78	22. 56	89. 05	....	. 35	209, 662. 35	491. 52	210, 153. 88

X.—QUANTITY AND COST OF SILVER USED IN THE COINAGE OF SILVER DOLLARS, WASTED AND SOLD IN SWEEPS, DURING THE CALENDAR YEAR 1894, UNDER ACT OF JULY 14, 1890.

MINT AT PHILADELPHIA.

Month.	COINED.		WASTED AND SOLD IN SWEEPS.		TOTAL EMPLOYMENT.		DOLLARS COINED.	SEIGNIORAGE.
	Ounces, standard.	Cost.	Ounces, standard.	Cost.	Ounces, standard.	Cost.		
January	....	....	....	......	....	....	....	....
February	....	....	....	......	....	....	....	....
March	216.56	$176.41	....	......	216.56	$176.41	$252.00	$75.59
April	....	....	....	......	....	....	....	....
May	....	....	....	......	....	....	....	....
June	153.83	125.31	....	......	153.83	125.31	179.00	53.69
July	....	....	....	......	....	....	....	....
August	41,250.00	33,602.76	....	......	41,250.00	33,602.76	48,000.00	14,397.24
September	10,484.37	8,540.70	....	......	10,484.37	8,540.70	12,200.00	3,659.30
October	42,968.75	35,002.87	....	......	42,968.75	35,002.87	50,000.00	14,997.13
November	....	....	....	......	....	....	....	....
December	293.05	238.72	....	......	293.05	238.72	341.00	102.28
Total	95,366.56	77,686.77	....	......	95,366.56	77,686.77	110,972.00	33,285.23

MINT AT SAN FRANCISCO.

Month.	COINED.		WASTED AND SOLD IN SWEEPS.		TOTAL EMPLOYMENT.		DOLLARS COINED.	SEIGNIORAGE.
	Ounces, standard.	Cost.	Ounces, standard.	Cost.	Ounces, standard.	Cost.		
January	....	....	....	......	....	....	....	....
February	....	....	....	......	....	....	....	....
March	....	....	....	......	....	....	....	....
April	....	....	....	......	....	....	....	....
May	....	....	....	......	....	....	....	....
June	....	....	....	......	....	....	....	....
July	137,500.00	$110,993.49	....	......	137,500.00	$110,993.49	$160,000	$49,006.51
August	257,812.50	208,112.79	....	......	257,812.50	208,112.79	300,000	91,887.21
September	257,812.50	208,112.79	....	......	257,812.50	208,112.79	300,000	91,887.21
October	214,843.75	173,427.33	....	......	214,843.75	173,427.33	250,000	76,572.67
November	128,906.25	104,056.39	....	......	128,906.25	104,056.39	150,000	45,943.61
December	85,937.50	69,370.93	....	......	85,937.50	69,370.93	100,000	30,629.07
Total	1,082,812.50	874,073.72	....	......	1,082,812.50	874,073.72	1,260,000	385,926.28

MINT AT NEW ORLEANS.

Month.	COINED.		WASTED AND SOLD IN SWEEPS.		TOTAL EMPLOYMENT.		DOLLARS COINED.	SEIGNIORAGE.
	Ounces, standard.	Cost.	Ounces, standard.	Cost.	Ounces, standard.	Cost.		
January	....	....	....	......	....	....	....	....
February	....	....	....	......	....	....	....	....
March	....	....	....	......	....	....	....	....
April	....	....	....	......	....	....	....	....
May	....	....	....	......	....	....	....	....
June	....	....	....	......	....	....	....	....
July	226,015.63	$174,666.00	....	......	226,015.63	$174,666.00	$263,000	$88,334.00
August	343,750.00	265,651.71	....	......	343,750.00	265,651.71	400,000	134,348.29
September	309,375.00	239,086.54	....	......	309,375.00	239,086.54	360,000	120,913.46
October	257,812.50	199,238.78	....	......	257,812.50	199,238.78	300,000	100,761.22
November	214,843.75	166,032.32	....	......	214,843.75	166,032.32	250,000	83,967.68
December	128,906.25	99,619.39	....	......	128,906.25	99,619.39	150,000	50,380.61
Total	1,480,703.13	1,144,294.74	....	......	1,480,703.13	1,144,294.74	1,723,000	578,705.26

RECAPITULATION.

Month.	Coined.		Wasted and sold in sweeps.		Total employment.		Dollars coined.	Seigniorage.
	Ounces, standard.	Cost.	Ounces, standard.	Cost.	Ounces, standard.	Cost.		
January	....	....	....	.....	....	....	....	....
February	....	....	....	.....	....	....	....	....
March	216. 56	$176. 41	....	.....	216. 56	$176. 41	$252. 00	$75. 59
April	....	....	....	.....	....	....	....	....
May	....	....	....	.....	....	....	....	....
June	153. 83	125. 31	....	.....	153. 83	125. 31	179. 00	53. 69
July	363. 515. 63	285, 659. 49	....	.....	363, 515. 63	285, 659. 49	423, 000. 00	137 340. 51
August	642. 812. 50	507, 367. 26	....	.....	642, 812. 50	507, 367. 26	748, 000. 00	240, 632. 74
September	577, 671. 87	455, 740. 03	....	.....	577, 671. 87	455, 740. 03	672, 200. 00	216, 459. 97
October	515. 625. 00	407, 668. 98	....	.....	515, 625. 00	407. 668. 98	600, 000. 00	192, 331. 02
November	343 750. 00	270, 088. 71	....	.....	343, 750. 00	270, 088. 71	400, 000. 00	129, 911. 29
December	215, 136. 80	169, 229. 04	....	.....	215, 136. 80	169, 229. 04	250, 341. 00	81, 111. 96
Total	2, 658. 882. 19	2. 096, 055. 23	....	.....	2, 658, 882. 19	2. 096, 055. 23	3, 093, 972. 00	997, 916. 77

XI.—NOMINAL VALUE OF MATERIALS USED IN THE SUBSIDIARY SILVER COINAGE DURING THE CALENDAR YEAR 1894.

Sources from which bullion was obtained.	Ounces, fine.	Cost.	Coinage.
MINT AT PHILADELPHIA.			
Worn and uncurrent coin transferred from Treasury	841, 452. 34	$1, 163, 231. 16	$1, 396, 376. 60
Partings, charges, and fractions purchased	169, 552. 18	112, 264. 35	169, 449. 60
Melted assay coins purchased	1, 064. 52	1, 464. 32	
Mutilated coins purchased	1, 054. 39	660. 52	
Surplus bullion purchased	6, 491. 41	4, 235 27	
Total	1, 019, 614. 84	1, 281, 855. 62	1, 565, 826. 20
MINT AT SAN FRANCISCO.			
Worn and uncurrent coin transferred from Treasury	1, 994, 182. 07	2, 756, 774. 90	2, 686, 552. 65
Partings, charges, and fractions purchased	36, 874. 41	22, 548. 99	....
Mutilated coins purchased	73. 98	45. 67	
Surplus bullion purchased	3, 325. 69	2, 084. 32	
Total	2, 034, 456. 15	2, 781, 453. 88	2, 686, 552. 65
MINT AT NEW ORLEANS.			
Worn and uncurrent coin transferred from Treasury	1, 200, 950. 12	1, 660, 204. 05	1, 854, 000. 00
Partings, charges, and fractions purchased	2, 222. 88	1, 366. 40	....
Mutilated coins purchased	957. 69	570. 85	
Surplus bullion purchased	455. 85	260. 16	
Total	1, 204, 586. 54	1, 662, 401. 46	1, 854, 000. 00
MINT AT CARSON.			
Partings, charges, and fractions purchased	2, 573. 94	1, 597. 57	....
Surplus bullion purchased	72. 84	44. 54	
Total	2, 646. 78	1, 642. 11	....
SUMMARY.			
Worn and uncurrent coin transferred from Treasury	4, 036, 584. 53	5, 580, 210. 11	5, 936, 929. 25
Partings, charges, and fractions purchased	211, 223. 41	137, 777. 31	169, 449. 60
Melted assay coins purchased	1, 064. 52	1, 464. 32	
Mutilated coins purchased	2, 086. 06	1, 277. 04	
Surplus bullion purchased	10, 345. 79	6, 624. 29	
Total	4, 261, 304. 31	5, 727, 353. 07	6, 106, 378. 85

XII.—Silver for Subsidiary

Stock.	PHILADELPHIA.		SAN FRANCISCO.	
	Ounces, fine.	Cost.	Ounces, fine.	Cost.
Silver bullion on hand January 1, 1894	181,769.13	$244,442.74	532,691.71	$733,059.51
Uncurrent coins transferred from Treasury	841,452.34	1,163,231.16	1,994,182.07	2.756.774.90
Partings, charges, and fractions purchased	169,552.18	112,264.35	36,874.41	22.548.99
Melted assay coins purchased	1,064.52	1,464.32	....	....
Mutilated coins purchased	1,054.39	660.52	73.98	45.67
Surplus bullion purchased	6,491.41	4,235.27	3,325.69	2,084.32
Total stock	1,201,383.97	1,526,298 36	2,567.147.86	3,514.513.39
Used in coinage, calendar year 1894	1,132,679.52	1,478,317.04	1,943,385.03	2,686,552.65
Sold in sweeps	2,510.54	1,662.35	1,547.61	969.93
Wasted by operative officers	948.31	618.72	1,159.07	723.20
Balance on hand January 1, 1895	65 245.60	45,700.25	621,056.15	826.267.61
Total	1,201,383.97	1,526,298.36	2,567,147.86	3,514,513.39

XIII.—Coinage Executed at the Mints of the United States

Denomination.	PHILADELPHIA.	
	Pieces.	Value.
GOLD.		
Double eagles	1,368,990	$27,379,800.00
Eagles	2,470,778	24,707,780.00
Half eagles	957,955	4,789,775.00
Quarter eagles	4,122	10,305.00
Total gold coinage	4,801.845	56,887.660.00
SILVER.		
Dollars, act July 14, 1890	110.972	110,972.00
Subsidiary:		
Half dollars	1,148,972	574,486.00
Quarter dollars	3,432,972	858,243.00
Dimes	1,330,972	133,097.20
Total subsidiary	5,912,916	1,565,826.20
Total silver coinage	6,023,888	1,676,798.20
MINOR.		
Five cents	5,413,132	270,656.60
One cent	16,752,132	167,521.32
Total minor coinage	22,165,264	438,177.92
Total coinage	32,990,997	59.002,636.12

Coinage in Calendar Year 1894.

NEW ORLEANS.		CARSON.		TOTAL.	
Ounces, fine.	Cost.	Ounces, fine.	Cost.	Ounces, fine.	Cost.
140,909.27	$194,526.41	183.07	$122.06	855,553.18	$1,172,150.72
1,200,950.12	1,660,204.05	....	....	4,036,584.53	5,580,210.11
2,222.88	1,366.40	2,573.94	1,597.57	211,223.41	137,777.31
....	....	....	....	1,064.52	1,464.32
957.69	570.85	....	....	2,086.06	1,277.04
455.85	260.16	72.84	44.54	10,345.79	6,624.29
1,345,495.81	1,856,927.87	2,829.85	1,764.17	5,116,857.49	6,899,503.79
1,341,137.25	1,854,000.00	....	....	4,417,201.80	6,018,869.69
1,854.61	1,172.33	1,233.89	756.25	7,146.65	4,560.86
108.04	61.66	1,241.87	787.60	3,457.29	2,191.18
2,395,91	1,693.88	354.09	220.32	689,051.75	873,882.06
1,345,495.81	1,856,927.87	2,829.85	1,764.17	5,116,857.49	6,899,503.79

during the Calendar Year ended December 31, 1894.

SAN FRANCISCO.		NEW ORLEANS.		TOTAL.	
Pieces.	Value.	Pieces.	Value.	Pieces.	Value.
1,048,550	$20,971,000.00	....	....	2,417,540	$48,350,800.00
25,000	250,000.00	107,500	$1,075,000.00	2,603,278	26,032,780.00
55,900	279,500.00	16,600	83,000.00	1,030,455	5,152,275.00
....	....	....	....	4,122	10,305.00
1,129,450	21,500,500.00	124,100	1,158,000.00	6,055,395	79,546,160.00
1,260,000	1,260,000.00	1,723,000	1,723,000.00	3,093,972	3,093,972.00
4,048,690	2,024,345.00	2,138,000	1,069,000.00	7,335,662	3,667,831.00
2,648,821	662,205.25	2,852,000	713,000.00	8,933,793	2,233,448.25
24	2.40	720,000	72,000.00	2,050,996	205,099.60
6,697,535	2,686,552.65	5,710,000	1,854,000.00	18,320,451	6,106,378.85
7,957,535	3,946,552.65	7,433,000	3,577,000.00	21,414,423	9,200,350.85
....	....	....	....	5,413,132	270,656.60
....	....	....	....	16,752,132	167,521.32
....	....	....	....	22,165,264	438,177.92
9,086,985	25,447,052.65	7,557,100	4,735,000.00	49,635,082	89,184,688.77

XIV.—ASSETS AND LIABILITIES OF THE UNITED STATES

ASSETS.

Institution.	GOLD BULLION.		SILVER BULLION.		Value of bullion shipped for coinage.
	Ounces, standard.	Value.	Ounces, standard.	Value (cost).	
COINAGE MINTS.					
Philadelphia	1, 264, 489. 894	$23, 525, 393. 29	132, 191, 445. 83	$107, 671, 300. 89	....
San Francisco	111, 123. 223	2, 067, 408. 74	12, 926, 055. 23	10, 703, 471. 48	....
Carson	36, 868. 816	685, 931. 51	817, 506. 62	588, 963. 62	....
New Orleans	49, 411. 248	919, 279. 49	8, 505, 180. 05	6, 572, 482. 03	....
ASSAY OFFICES.					
New York	1, 057, 928. 458	19, 682. 389. 74	515. 913. 38	506, 825. 84	....
Denver	7, 769 921	144, 556. 68	1, 300. 71	728. 40	$81, 924. 65
Boise	1, 360. 632	25, 314. 10	470. 91	263. 71	28, 315. 47
Helena	1, 410. 846	26, 248. 31	482. 73	270. 33	54, 594. 35
Charlotte	1, 074. 779	19, 995. 90	104. 30	58. 36	....
St. Louis	561. 618	10, 448. 69	87. 78	49. 12	....
Total	2, 531, 999. 435	47, 106, 966. 45	154, 958, 547. 54	126, 044, 413. 78	164, 834. 47

LIABILITIES.

Institution.	Bullion fund.	Undeposited earnings.
COINAGE MINTS.		
Philadelphia	$192, 084, 360. 07	....
San Francisco	54, 641, 985. 49	$3. 00
Carson	6, 609, 266. 15	....
New Orleans	17, 870, 561. 06	....
ASSAY OFFICES.		
New York	23, 744, 627. 89	5, 438. 18
Denver	242, 299. 55	1, 926. 74
Boise	66, 940. 21	409. 60
Helena	259, 247. 97	1, 330. 16
Charlotte	52, 100. 96	301. 52
St. Louis	61, 103. 77	115. 82
Total	295, 632, 493. 12	9, 525. 02

MINTS AND ASSAY OFFICES DECEMBER 31, 1894.

ASSETS.

Gold coin.	Silver coin.	Lawful money.	Minor coin.	Minor coinage metal.	Deficiencies.	Total.
$10, 276, 130. 00	$50, 842, 343. 90		$79, 665. 80	$281, 341. 17	$22, 810. 82	$192, 698, 985. 87
3, 573, 645. 00	37, 985, 101. 58				413, 557. 96	54, 743, 184. 76
121, 320. 94	5, 213, 050. 08					6, 609, 266. 15
1, 276, 245. 00	9, 212, 758. 82				25, 000. 00	18, 005, 765. 34
3, 614, 307. 00	36, 740. 89					23, 840, 263. 47
		$17, 016. 56				244, 226. 29
		13, 456. 53				67, 349. 81
		179, 465. 14				260, 578. 13
		32, 348. 22				52, 402. 48
		50, 721. 78				61, 219. 59
18, 861, 647. 94	103, 289, 995. 27	293, 008. 23	79, 665. 80	281, 341. 17	461, 368. 78	296, 583, 241. 89

LIABILITIES.

Seigniorage on silver.	Unpaid depositors.	Minor coinage profits.	Minor coin metal fund.	Unpaid cent depositors and subtreasury transfors.	Total.
$87, 119. 94	$166, 498. 89	$92, 142. 13	$28, 500. 00	$240, 364. 84	$192, 698, 985. 87
30, 629. 07	70, 567. 20				54, 743, 184. 76
					6, 609, 266. 15
134, 353. 26	851. 02				18, 005, 765. 34
	90, 197. 40				23, 840, 263. 47
					244, 226. 29
					67, 349. 81
					260, 578. 13
					52, 402. 48
					61, 219. 59
252, 102. 27	328, 114. 51	92, 142. 13	28. 500. 00	210. 364. 84	296, 583, 241. 89

XV.—UNREFINED GOLD AND SILVER OF DOMESTIC PRODUCTION, WITH THE STATES AND TERRITORIES PRODUCING THE SAME, AND REFINED DOMESTIC BULLION NOT DISTRIBUTED, BY VALUE, DEPOSITED AT THE MINTS AND ASSAY OFFICES FROM THEIR ORGANIZATION TO THE CLOSE OF THE CALENDAR YEAR ENDED DECEMBER 31, 1894.

Source.	Gold.	Silver.	Total.
Alabama	$246,356.98	$253.75	$246,610.73
Alaska	1,483,536.88	15,529.64	1,499,066.52
Arizona	6,951,793.19	14,085,175.88	21.036,969.07
California	767,568,763.99	4,241,156.90	771,809,920.89
Colorado	68,246,222.38	24,800,914.45	93.047,136.83
Georgia	9,210,074.50	6,851.56	9,216,926.06
Idaho	35,201,629.69	1,960,383.64	37,162,013.33
Iowa	115.59	1.38	116.97
Maine	6,311.06	22.90	6,333.96
Maryland	17,578.38	40.91	17,619.29
Michigan	418,294.12	4,063,354.04	4,481,648.16
Minnesota	4,954.07	63.41	5,017.48
Missouri	96.71	359.11	455.82
Montana	73,490,543.57	21,982,919.05	95,473,462.62
Nebraska	1,921.79	273,226.13	275,147.92
Nevada	33,678,267.56	104,191,259.88	137,869,527.44
New Hampshire	481.34	1.75	483.09
New Mexico	6,080,775.90	7,059,250.52	13,140,026.42
North Carolina	11,773,222.35	66,441.54	11,839,663.89
Oregon	21,999,696.50	94,499.95	22,094,196.45
South Carolina	2,319,436.73	3,969.82	2,323,406.55
South Dakota	50,923,627.71	1,051,824.45	51,975,452.16
Tennessee	107,177.22	14.15	107,191.37
Texas	7,910.56	3,447.01	11,357.57
Utah	1,477,262.74	19,920,438.78	21,397,701.52
Vermont	78,647.87	84.65	78,732.52
Virginia	1,760,135.87	438.02	1,760,573.89
Washington	927,925.42	12,959.31	940,884.73
Wisconsin	325.73	7.02	332.75
Wyoming	848,335.02	13,060.55	861,395.57
Other sources	41,938,019.62	42,908,151.26	84,846,170.88
Total unrefined bullion	1,136,769,441.04	246,756,101.41	1,383,525,542.45
Refined bullion	450,641,481.96	526,943,607.40	977,585,089.36
Total bullion	1,587,410,923.00	773,699,708.81	2,361,110,631.81

XVI.—PRODUCT OF GOLD AND SILVER IN THE UNITED STATES FROM 1792 TO 1844, AND ANNUALLY SINCE.

[The estimate for 1792-1873 is by R. W. Raymond, Commissioner, and since by Director of the Mint.]

Year.	Gold.	Silver.	Total.
April 2, 1792—July 31, 1834	$14,000,000	Insignificant.	$14,000,000
July 31, 1834—December 31, 1844	7,500,000	$250,000	7,750,000
1845	1,008,327	50,000	1,058,327
1846	1,139,357	50,000	1,189,357
1847	889,085	50,000	939,085
1848	10,000,000	50,000	10,050,000
1849	40,000,000	50,000	40,050,000
1850	50,000,000	50,000	50,050,000
1851	55,000,000	50,000	55,050,000
1852	60,000,000	50,000	60,050,000
1853	65,000,000	50,000	65,050,000
1854	60,000,000	50,000	60,050,000
1855	55,000,000	50,000	55,050,000
1856	55,000,000	50,000	55,050,000
1857	55,000,000	50,000	55,050,000
1858	50,000,000	500,000	50,500,000
1859	50,000,000	100,000	50,100,000
1860	46,000,000	150,000	46,150,000
1861	43,000,000	2,000,000	45,000,000
1862	39,200,000	4,500,000	43,700,000
1863	40,000,000	8,500,000	48,500,000
1864	46,100,000	11,000,000	57,100,000
1865	53,225,000	11,250,000	64,475,000
1866	53,500,000	10,000,000	63,500,000
1867	51,725,000	13,500,000	65,225,000
1868	48,000,000	12,000,000	60,000,000
1869	49,500,000	12,000,000	61,500,000
1870	50,000,000	16,000,000	66,000,000
1871	43,500,000	23,000,000	66,500,000
1872	36,000,000	28,750,000	64,750,000
1873	36,000,000	35,750,000	71,750,000
1874	33,500,000	37,300,000	70,800,000
1875	33,400,000	31,700,000	65,100,000
1876	39,900,000	38,800,000	78,700,000
1877	46,900,000	39,800,000	86,700,000
1878	51,200,000	45,200,000	96,400,000
1879	38,900,000	40,800,000	79,700,000
1880	36,000,000	39,200,000	75,200,000
1881	34,700,000	43,000,000	77,700,000
1882	32,500,000	46,800,000	79,300,000
1883	30,000,000	46,200,000	76,200,000
1884	30,800,000	48,800,000	79,600,000
1885	31,800,000	51,600,000	83,400,000
1886	35,000,000	51,000,000	86,000,000
1887	33,000,000	53,350,000	86,350,000
1888	33,175,000	59,195,000	92,370,000
1889	32,800,000	64,646,000	97,446,000
1890	32,845,000	70,465,000	103,310,000
1891	33,175,000	75,417,000	108,592,000
1892	33,000,000	82,101,000	115,101,000
1893	35,955,000	77,576,000	113,531,000
1894	39,500,000	64,000,000	103,500,000
Total	2,013,336,769	1,296,850,000	3,310,186,769

XVII.—Wells, Fargo & Company, (Express and Banking).—Precious Metals Product, United States and Mexico.

San Francisco, *December 31, 1894.*

The following is our annual report of precious metals produced in the States and Territories west of the Missouri River (including British Columbia) during 1894, which shows in the aggregate: Gold, $45,892,668; silver, $28,721,014; copper, $22,276,294; lead, $8,223,513. Total gross result, $105,113,489. The "commercial value" at which the several metals named herein have been estimated is: Silver, 63 cents per ounce; copper, 10 cents per pound, and lead, $3.11 per hundredweight.

As in former reports, allowance must be made for probable variations from exact figures, by reason of constantly increasing facilities for transporting bullion, ores, and base metals from the mines outside of the express and the difficulty of getting entirely reliable data from private sources. Estimates obtained in this way are liable to be exaggerated and are, to a considerable degree, guesswork; but with some modifications on this account made herein, the general results reached, while only approximately correct, may be accepted as the closest approximation possible under the circumstances.

States and Territories.	Gold dust and bullion by express.	Gold dust and bullion by other conveyances.	Silver bullion by express.	Ores and base bullion by freight.	Total.
California	$10,690,646	$1,850,000	$183,305	$1,464,631	$14,188,582
Nevada	1,446,313		755,863	898,384	3,100,560
Oregon	1,453,218	150,000	108,444		1,711,662
Washington	255,513	35,000	153,050		443,563
Alaska		898,246		8,000	906,246
Idaho	1,879,000		2,359,000	3,738,220	7,976,220
Montana	5,150,000		7,150,000	17,950,000	30,250,000
Utah	529,689		1,238,455	5,434,444	7,202,588
Colorado	12,175,207		11,350,898	3,241,945	26,768,050
New Mexico	336,471	145,000	195,490	1,194,398	1,871,359
Arizona	1,211,284	350,000	197,280	5,237,267	6,995,831
Dakota	2,799,835		211,074	35,000	3,045,909
Texas			338,542		338,542
Wyoming	35,000		10,000		45,000
British Columbia	269,377				269,377
Total	38,231,553	3,428,246	24,251,401	39,202,289	105,113,489

The gross yield for 1894, shown above, segregated, is approximately as follows:

Metal.	Per cent of total.	Total value.
Gold	43.66	$45,892,668
Silver	27.33	28,721,014
Copper	21.19	22,276,294
Lead	7.82	8,223,513
Total		105,113,489

ANNUAL PRODUCT OF LEAD, COPPER, SILVER, AND GOLD IN THE STATES AND TERRITORIES WEST OF THE MISSOURI RIVER, 1870–1894.

Year.	Production as per Wells, Fargo & Co.'s statements, including amounts from British Columbia and west coast of Mexico.	Product after deducting amounts from British Columbia and west coast of Mexico.	The net product of the States and Territories west of the Missouri River, exclusive of British Columbia and west coast of Mexico, divided, is as follows:			
			Lead.	Copper.	Silver.	Gold.
1870	$54, 000, 000	$52, 150, 000	$1, 080, 000	....	$17, 320, 000	$33, 750, 000
1871	58, 284, 000	55, 784, 000	2, 100. 000	....	19, 286, 000	34, 398, 000
1872	62, 236, 959	60, 351, 824	2, 250, 000	....	19, 924, 429	38, 177, 395
1873	72, 258, 693	70, 139, 860	3, 450, 000	....	27, 483, 302	39, 206, 558
1874	74, 401, 045	71, 965, 610	3, 800, 000	....	29, 699, 122	33, 466, 488
1875	80, 889, 057	76, 703, 433	5, 100, 000	....	31, 635, 239	39, 968, 194
1876	90, 875, 173	87, 219. 859	5, 040, 000	....	39, 292, 924	42, 886, 935
1877	98, 421, 754	95, 811, 582	5, 085, 250	....	45, 846, 109	44, 880, 223
1878	81, 154, 622	78, 276, 167	3, 452, 000	....	37, 248, 137	37, 576, 030
1879	75, 349, 501	72, 688, 888	4, 185, 769	....	37, 032, 857	31, 470, 262
1880	80, 167, 936	77, 232, 512	5, 742, 390	$898, 000	38, 033, 055	32, 559, 067
1881	84, 504, 417	81, 198, 474	6, 361, 902	1, 195, 000	42. 987, 613	30, 653, 959
1882	92, 411, 835	89, 207, 549	8, 008. 155	4, 055, 037	48, 133, 039	29, 011, 318
1883	90, 313, 612	84, 639, 212	8, 163, 550	5, 683, 921	42, 975, 101	27, 816, 640
1884	84, 975, 954	81, 633, 835	6, 834, 091	6, 086. 252	43, 529, 925	25, 183, 567
1885	90, 181, 260	87, 311, 382	8, 562, 991	7, 838, 036	44, 516, 599	26, 393, 756
1886	103, 011, 761	100, 160, 222	9, 185, 192	9, 276, 755	52, 136, 851	29, 561, 424
1887	104, 645, 959	103, 327, 770	9, 631, 073	10, 362, 746	50, 833, 884	32, 500, 067
1888	114, 341, 592	112, 665, 569	11, 263, 630	18, 261, 490	53, 152, 747	29, 987, 702
1889	127, 677, 836	126, 723, 384	14, 593, 323	14, 793. 763	64, 808, 637	32, 527, 661
1890	127, 166, 410	126, 804, 855	11, 509, 571	20, 569, 092	62, 930, 831	31, 795, 361
1891	118, 237, 441	117, 946, 565	12, 385, 780	13, 261, 663	60, 614, 004	31. 685, 118
1892	111, 531, 700	111, 259, 508	11, 433, 947	19, 370, 516	50, 607, 601	29, 847, 444
1893	104, 081, 591	103, 827, 623	7, 756, 040	23, 631, 339	38, 491, 521	33, 948, 723
1894	105, 113, 489	104, 844, 112	8, 223, 513	22. 276, 294	28, 721, 014	45, 892, 668

The exports of silver during the past year to Japan, China, the Straits, etc., have been as follows: From London, $47,502,180; from San Francisco, $12, 520,678. Total, $60,022,858, as against $67,715,485 last year. Pound sterling estimated at $4.84.

Statement of the Product of Gold and Silver in the Republic of Mexico, Revised and Corrected, from 1877 to 1894.

[Values upon mintage basis.]

Year.	Gold.	Silver.	Total.
1877-78	$747, 000	$24, 837, 000	$25, 584, 000
1878-79	881, 000	25, 125, 000	26, 006, 000
1879-80	942, 000	26, 800, 000	27, 742, 000
1880-81	1, 013, 000	29, 234, 000	30, 247, 000
1881-82	937, 000	29, 329, 000	30, 266, 000
1882-83	956, 000	29, 569, 000	30, 525, 000
1883-84	1, 055, 000	31, 695, 000	32, 750, 000
1884-85	914, 000	33, 226, 000	34, 140, 000
1885-86	1, 026, 000	34, 112, 000	35, 138, 000
1886-87	1, 047, 000	34, 600, 000	35, 647, 000
1887-88	1, 031, 000	34, 912, 000	35, 943, 000
1888-89	1, 040, 000	40, 706, 000	41, 746, 000
1889-90	1, 100, 000	41, 500, 000	42, 600, 000
1890-91	1, 150, 000	43, 000, 000	44, 150, 000
1891-92	1, 275, 000	45, 750, 000	47, 025, 000
1892-93	1, 400, 000	48, 500, 000	49, 900, 000
1893-94	1, 425, 000	47, 250, 000	48, 675, 000
Total	17, 939, 000	600, 145, 000	618, 084, 000

Exhibit of Coinage of Gold, Silver, and Copper in the Republic of Mexico from July 1, 1873, to June 30, 1894.

Year.	Gold.	Silver.	Copper.
1873-74	$866, 743	$18, 846, 067	$15, 966
1874-75	862, 619	19, 386, 958	21, 712
1875-76	809, 401	19, 454, 054	30, 654
1876-77	695, 750	21, 415, 128	9, 035
1877-78	691, 998	22, 084, 203	41, 364
1878-79	658, 206	22, 162, 987	16, 300
1879-80	521, 826	24, 018, 528	14, 035
1880-81	492, 068	24, 617, 395	42, 258
1881-82	452, 590	25, 146, 260	11, 972
1882-83	407, 600	24, 083, 921	....
1883-84	328, 698	25, 377, 379	....
1884-85	423, 250	25, 840, 728	....
1885-86	425, 000	25, 850, 000	....
1886-87	410, 000	25, 600, 000	....
1887-88	340, 320	26, 711, 000	....
1888-89	305, 100	25, 274, 500	....
1889-90	243, 298	24, 328, 326	....
1890-91	308, 000	24, 238, 000	....
1891-92	291, 940	25, 527, 000	....
1892-93	361, 672	27, 169, 876	....
1893-94	553, 978	30, 185, 611	....
Total	10, 450, 057	507, 317, 921	203, 296

Summary.—Totals: Gold, $10,450,057; silver, $507,317,921; copper, $203,296; grand total, $517,971,274.

EXHIBIT OF THE COINAGE OF MEXICO FROM THE ESTABLISHMENT OF THE MINTS, IN 1537, TO THE END OF THE FISCAL YEAR OF 1894.

Period.	Gold.	Silver.	Copper.	Total.
COLONIAL EPOCH.				
Unmilled coin, from 1537 to 1731	$8,497,950	$752,067.456	$200,000	$760,765,406
Pillar coin, 1732 to 1771	19,889,014	441,629,211	....	461,518,225
Bust coin, 1772 to 1821	40,391,447	888,563,989	342.893	929,298,329
Total	68,778,411	2,082,260,656	542,893	2,151,581,960
INDEPENDENCE.				
Iturbide's imperial bust, from 1822 to 1823	557,392	18,575,569	....	19,132,961
Republic eagle, 1824 to June 30, 1873	45,040,628	740,246,485	5.235,177	790,522,290
Total	45,598,020	758,822,054	5,235,177	809,655,251
REPUBLIC.				
Eagle coin, from July 1, 1873, to June 30, 1894.	10,450,057	507,317,921	203,296	517,971,274

SUMMARY.—Colonial epoch, from 1537 to 1821, $2,151,581,960; independence, from 1822 to 1873, $809,655,251; republic, from 1873 to 1894, $517,971,274; total, $3,479,208,485.

JNO. J. VALENTINE, *President.*

XVIII.—Highest, Lowest, and Average Price of Bar Silver in London per Ounce, British Standard (.925), since 1833, and the Equivalent in United States Gold Coin of an Ounce 1,000 Fine taken at the Average Price.

Calendar year.	Lowest quotation.	Highest quotation.	Average quotation.	Value of an ounce, fine at average quotation.
	d.	d.	d.	*Dollars*
1833	$58\frac{3}{4}$	$59\frac{7}{8}$	$59\frac{3}{16}$	1.297
1834	$59\frac{3}{4}$	$60\frac{3}{4}$	$59\frac{15}{16}$	1.313
1835	$59\frac{1}{4}$	60	$59\frac{11}{16}$	1.308
1836	$59\frac{5}{8}$	$60\frac{3}{8}$	60	1.315
1837	59	$60\frac{3}{8}$	$59\frac{9}{16}$	1.305
1838	$59\frac{1}{2}$	$60\frac{1}{8}$	$59\frac{1}{2}$	1.304
1839	60	$60\frac{5}{8}$	$60\frac{3}{8}$	1.323
1840	$60\frac{1}{8}$	$60\frac{3}{4}$	$60\frac{3}{8}$	1.323
1841	$59\frac{3}{4}$	$60\frac{3}{8}$	$60\frac{1}{16}$	1.316
1842	$59\frac{1}{4}$	60	$59\frac{7}{16}$	1.303
1843	59	$59\frac{5}{8}$	$59\frac{3}{16}$	1.297
1844	$59\frac{1}{4}$	$59\frac{3}{4}$	$59\frac{1}{2}$	1.304
1845	$58\frac{7}{8}$	$59\frac{7}{8}$	$59\frac{1}{4}$	1.298
1846	59	$60\frac{1}{8}$	$59\frac{5}{16}$	1.30
1847	$58\frac{7}{8}$	$60\frac{3}{8}$	$59\frac{11}{16}$	1.308
1848	$58\frac{1}{2}$	60	$59\frac{1}{2}$	1.304
1849	$59\frac{1}{2}$	60	$59\frac{3}{4}$	1.309
1850	$59\frac{1}{2}$	$61\frac{1}{2}$	$61\frac{1}{16}$	1.316
1851	60	$61\frac{5}{8}$	61	1.337
1852	$59\frac{7}{8}$	$61\frac{7}{8}$	$60\frac{1}{2}$	1.326
1853	$60\frac{5}{8}$	$61\frac{7}{8}$	$61\frac{1}{2}$	1.348
1854	$60\frac{7}{8}$	$61\frac{7}{8}$	$61\frac{1}{2}$	1.348
1855	60	$61\frac{5}{8}$	$61\frac{5}{16}$	1.344
1856	$60\frac{1}{2}$	$62\frac{1}{4}$	$61\frac{5}{16}$	1.344
1857	61	$62\frac{3}{8}$	$61\frac{3}{4}$	1.353
1858	$60\frac{3}{4}$	$61\frac{7}{8}$	$61\frac{5}{16}$	1.344
1859	$61\frac{3}{4}$	$62\frac{3}{4}$	$62\frac{1}{16}$	1.36
1860	$61\frac{1}{4}$	$62\frac{3}{8}$	$61\frac{11}{16}$	1.352
1861	$60\frac{1}{8}$	$61\frac{3}{8}$	$60\frac{13}{16}$	1.333
1862	61	$62\frac{1}{8}$	$61\frac{7}{16}$	1.346
1863	61	$61\frac{3}{4}$	$61\frac{3}{8}$	1.345
1864	$60\frac{5}{8}$	$62\frac{1}{2}$	$61\frac{3}{8}$	1.345
1865	$60\frac{1}{2}$	$61\frac{5}{8}$	$61\frac{1}{16}$	1.338
1866	$60\frac{3}{8}$	$62\frac{1}{4}$	$61\frac{1}{8}$	1.339
1867	$60\frac{3}{8}$	$61\frac{1}{4}$	$60\frac{9}{16}$	1.328
1868	$60\frac{1}{8}$	$61\frac{1}{8}$	$60\frac{1}{2}$	1.326
1869	60	61	$60\frac{7}{16}$	1.325
1870	$60\frac{1}{4}$	$60\frac{3}{4}$	$60\frac{9}{16}$	1.328
1871	$60\frac{3}{16}$	61	$60\frac{1}{2}$	1.326
1872	$59\frac{1}{4}$	$61\frac{1}{8}$	$60\frac{5}{16}$	1.322
1873	$57\frac{7}{8}$	$59\frac{15}{16}$	$59\frac{1}{4}$	1.298
1874	$57\frac{1}{4}$	$59\frac{1}{2}$	$58\frac{5}{16}$	1.278
1875	$55\frac{1}{2}$	$57\frac{5}{8}$	$56\frac{7}{8}$	1.246
1876	$46\frac{3}{4}$	$58\frac{1}{2}$	$52\frac{3}{4}$	1.156
1877	$53\frac{1}{4}$	$58\frac{1}{4}$	$54\frac{13}{16}$	1.201
1878	$49\frac{1}{2}$	$55\frac{1}{4}$	$52\frac{9}{16}$	1.152
1879	$48\frac{7}{8}$	$53\frac{3}{4}$	$51\frac{1}{4}$	1.123
1880	$51\frac{5}{8}$	$52\frac{7}{8}$	$52\frac{1}{4}$	1.145
1881	$50\frac{7}{8}$	$52\frac{7}{8}$	$51\frac{15}{16}$	1.138
1882	50	$52\frac{3}{8}$	$51\frac{13}{16}$	1.136
1883	50	$51\frac{3}{16}$	$50\frac{5}{8}$	1.11
1884	$49\frac{1}{2}$	$51\frac{3}{8}$	$50\frac{3}{4}$	1.113
1885	$46\frac{7}{8}$	50	$48\frac{9}{16}$	1.0645
1886	42	47	$45\frac{3}{8}$	0.9946
1887	$43\frac{1}{4}$	$47\frac{1}{8}$	$44\frac{5}{8}$	0.97823
1888	$41\frac{5}{8}$	$44\frac{9}{16}$	$42\frac{7}{8}$	0.93897
1889	42	$44\frac{3}{8}$	$41\frac{11}{16}$	0.93512
1890	$43\frac{5}{8}$	$54\frac{5}{8}$	$47\frac{3}{4}$	1.04633
1891	$43\frac{1}{2}$	$48\frac{3}{4}$	$45\frac{1}{16}$	0.98782
1892	$37\frac{7}{8}$	$43\frac{3}{4}$	$39\frac{3}{4}$	0.87106
1893	$30\frac{1}{2}$	$38\frac{3}{4}$	$35\frac{9}{16}$	0.78031
1894	27	$31\frac{3}{4}$	$28\frac{7}{8}$	0.64043

XIX.—COMMERCIAL RATIO OF SILVER TO GOLD EACH YEAR SINCE 1687.

[NOTE.—From 1687 to 1832 the ratios are taken from Dr. A. Soetbeer; from 1833 to 1878 from Pixley and Abell's tables, and from 1879 to 1890 from daily cablegrams from London to the Bureau of the Mint.]

Year.	Ratio.	Year.	Ratio.	Year.	Ratio.	Year.	Ratio.	Year.	Ratio.	Year.	Ratio.
1687....	14.94	1722...	15.17	1757...	14.87	1792...	15.17	1827...	15.74	1862...	15.35
1688....	14.94	1723...	15.20	1758...	14.85	1793...	15.00	1828...	15.78	1863...	15.37
1689....	15.02	1724...	15.11	1759...	14.15	1794...	15.37	1829...	15.78	1864...	15.37
1690....	15.02	1725...	15.11	1760..	14.14	1795...	15.55	1830...	15.82	1865...	15.44
1691....	14.98	1726...	15.15	1761...	14.54	1796...	15.65	1831...	15.72	1866...	15.43
1692....	14.92	1727...	15.24	1762...	15.27	1797...	15.41	1832...	15.73	1867...	15.57
1693....	14.83	1728...	15.11	1763...	14.99	1798...	15.59	1833...	15.93	1868...	15.59
1694....	14.87	1729...	14.92	1764...	14.70	1799...	15.74	1834...	15.73	1869...	15.60
1695....	15.02	1730...	14.81	1765...	14.83	1800...	15.68	1835...	15.80	1870...	15.57
1696....	15.00	1731...	14.94	1766...	14.80	1801...	15.46	1836...	15.72	1871...	15.57
1697....	15.20	1732...	15.09	1767...	14.85	1802...	15.26	1837...	15.83	1872...	15.63
1698....	15.07	1733...	15.18	1768...	14.80	1803...	15.41	1838...	15.85	1873...	15.92
1699....	14.94	1734...	15.39	1769...	14.72	1804...	15.41	1839...	15.62	1874...	16.17
1700....	14.81	1735...	15.41	1770...	14.62	1805...	15.79	1840...	15.62	1875...	16.59
1701....	15.07	1736...	15.18	1771...	14.66	1806...	15.52	1841..	15.70	1876...	17.88
1702....	15.52	1737...	15.02	1772...	14.52	1807...	15.43	1842...	15.87	1877...	17.22
1703....	15.17	1738...	14.91	1773...	14.62	1808...	16.08	1843...	15.93	1878...	17.94
1704....	15.22	1739...	14 91	1774...	14.62	1809...	15.96	1844...	15.85	1879...	18.40
1705....	15.11	1740...	14.94	1775...	14.72	1810...	15.77	1845...	15.92	1880...	18.05
1706....	15.27	1741...	14.92	1776...	14.55	1811...	15.53	1846...	15.90	1881...	18.16
1707....	15.44	1742...	14.85	1777...	14.54	1812...	16.11	1847...	15.80	1882...	18.19
1708....	15.41	1743...	14.85	1778...	14.68	1813...	16.25	1848...	15.85	1883...	18.64
1709....	15.31	1744...	14.87	1779...	14.80	1814...	15.04	1849...	15.78	1884...	18.57
1710....	15.22	1745...	14.98	1780...	14.72	1815...	15.26	1850...	15.70	1885...	19.41
1711....	15.29	1746...	15.13	1781...	14.78	1816...	15.28	1851...	15.46	1886...	20.78
1712....	15.31	1747...	15.26	1782...	14.42	1817...	15.11	1852...	15.59	1887...	21.13
1713....	15.24	1748...	15.11	1783...	14.48	1818...	15.35	1853...	15.33	1888...	21.99
1714....	15.13	1749...	14.80	1784...	14.70	1819...	15.33	1854...	15.33	1889...	22.10
1715....	15.11	1750...	14.55	1785...	14.92	1820...	15.62	1855...	15.38	1890...	19.76
1716....	15.09	1751...	14.39	1786...	14.96	1821...	15.95	1856...	15.38	1891...	20.92
1717....	15.13	1752...	14.54	1787...	14.92	1822...	15.80	1857...	15.27	1892...	23.72
1718....	15.11	1753...	14.54	1788...	14.65	1823...	15.84	1858...	15.38	1893...	26.49
1719....	15.09	1754...	14.48	1789...	14.75	1824...	15.82	1859...	15.19	1894...	32.56
1720....	15.04	1755...	14.68	1790...	15.04	1825...	15.70	1860...	15.29		
1721....	15.05	1756...	14.94	1791...	15.05	1826...	15.76	1861...	15.50		

XX.—IMPORTS AND EXPORTS OF GOLD AND SILVER DURING THE YEAR ENDED DECEMBER 31, 1894.

IMPORTS.

Port.	BULLION.		Total.
	Gold.	Silver.	
NEW YORK, N. Y.			
January	$42, 979	$51, 068	$94, 047
February	58, 907	58, 159	117, 066
March	49, 361	18, 020	67, 381
April	54, 586	48, 048	102, 634
May	54, 549	45, 527	100, 076
June	50, 163	19, 152	69, 315
July	36, 910	42, 493	79, 403
August	47, 442	43, 289	90, 731
September	54, 576	78, 548	133, 124
October	43, 338	83, 503	126, 841
November	38, 270	85, 235	123, 505
December	35, 138	65, 549	100, 687
Total	566, 219	638, 591	1, 204, 810
SAN FRANCISCO, CAL.			
January	24, 323	112, 767	137, 090
February	258, 377	148, 998	407, 375
March	16, 559	79, 601	96, 160
April	9, 985	61, 047	71, 032
May	27, 148	116, 562	143, 710
June	28, 434	89, 237	117, 671
July	42, 243	96, 701	138, 944
August	43, 579	99, 310	142, 889
September	29, 578	60, 120	89, 698
October	69, 132	126, 911	196, 043
November	62, 281	90, 527	152, 808
December	60, 786	109, 663	170, 449
Total	672, 425	1, 191, 444	1, 863, 869
ALL OTHER PORTS.			
January	97, 461	175, 338	272, 799
February	102, 116	144, 034	246, 150
March	78, 455	161, 337	239, 792
April	121, 752	138, 425	260, 177
May	127, 837	128, 174	256 011
June	78, 107	151, 863	229, 970
July	61, 947	131, 931	193, 878
August	67, 097	124, 769	191, 866
September	80, 583	99, 926	180, 509
October	136, 544	125, 622	262, 166
November	62, 599	185, 080	247, 679
December	60, 959	156, 644	217, 603
Total	[1] 1, 075, 457	[1] 1, 723, 143	2, 798, 600
Total imports (bullion)	2, 314, 101	3, 553, 178	5, 867, 279

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[1] Principally Mexican border ports.

XX.—IMPORTS AND EXPORTS OF GOLD AND SILVER, ETC.—Continued.

IMPORTS—Continued.

Port.	COIN.						Total gold and silver coin.
	GOLD.			SILVER.			
	United States.	Foreign.	Total.	United States.	Foreign.	Total.	
NEW YORK N. Y.							
January	$41. 743	$428, 011	$469, 754	$1, 148	$52, 065	$53, 213	$522, 967
February	83, 221	1, 475, 433	1, 558, 654	4, 636	69, 623	74, 259	1, 632. 913
March	41. 668	640, 385	682, 053	3, 012	136, 769	139, 781	821, 834
April	387, 900	1, 598, 976	1, 986, 876	1, 762	52. 424	54. 186	2, 041, 062
May	26, 044	3, 935, 645	3, 961, 689	1. 745	99, 409	101, 154	4, 062, 843
June	47, 631	519, 060	566. 691	7, 683	73, 085	80, 768	647, 459
July	99, 913	1, 159, 483	1, 259, 396	1, 888	129, 376	131, 264	1, 390, 660
August	122, 921	2, 759, 334	2, 882, 255	6, 154	53, 806	59, 960	2. 942, 215
September	266, 889	201, 495	468, 384	7, 198	82. 622	89. 820	558, 204
October	311, 157	542, 409	853, 566	3, 528	92, 645	96, 173	949, 739
November	1, 030, 961	11, 644	1, 042, 605	4, 888	8, 436	13 324	1, 055, 929
December	153, 229	8, 797	162, 026	2, 229	44, 460	46, 689	208, 715
Total	2, 613, 277	13, 280, 672	15, 893, 949	45, 871	894, 720	940, 591	16, 834, 540
SAN FRANCISCO, CAL.							
January	8, 867	....	8, 867	....	159, 558	159, 558	168, 425
February	918	5, 840	6, 758	....	34, 842	34, 842	41, 600
March	13, 990	....	13, 990	1, 000	19, 060	20, 060	34, 050
April	40, 705	....	40, 705	....	35, 121	35, 121	75, 826
May	7, 336	205	7, 541	....	153, 205	153, 205	160, 746
June	11, 536	....	11, 536	....	116, 263	116, 263	127, 799
July	5, 363	770	6, 133	....	47, 956	47, 956	54, 089
August	40, 135	55	40, 190	....	227, 130	227, 130	267, 320
September	13, 082	....	13, 082	111	11, 647	11, 758	24, 840
October	11, 693	486, 650	498, 343	....	136, 282	136, 282	634, 625
November	8, 057	....	8, 057	....	36, 807	36, 807	44, 864
December	40, 319	....	40, 319	....	2, 446	2, 446	42, 765
Total	202, 001	493, 520	695, 521	1, 111	980, 317	981, 428	1, 676, 949
ALL OTHER PORTS.							
January	27, 855	34, 408	62, 263	9, 346	349, 861	359, 207	421, 470
February	....	156, 170	156, 170	8, 597	394, 560	403, 157	559, 327
March	....	250, 974	250, 974	10, 311	223, 081	233, 392	484, 366
April	107, 757	....	107, 757	6, 806	263, 090	269, 896	377, 653
May	....	103, 979	103, 979	4, 404	226, 176	230, 580	334, 559
June	....	168, 417	168, 417	1, 117	317, 203	318, 320	486, 737
July	....	....	....	1, 148	506, 717	507, 865	507, 865
August	2, 100	100, 685	102, 785	2. 379	354, 422	356, 801	459, 586
September	5, 592	3, 800	9, 392	2, 308	549, 485	551, 793	561, 185
October	442	1, 300	1, 742	....	395, 104	395, 104	396, 846
November	704, 749	17, 040	721, 789	717	315, 360	316, 077	1, 037, 866
December	18, 722	....	18, 722	....	407, 019	407, 019	425 741
Total	867, 217	836, 773	1, 703, 990	47, 133	4, 302, 078	4, 349, 211	6, 053, 201
Total imports (coin)	3, 682, 495	14, 610, 965	18, 293, 460	94, 115	6, 177, 115	6, 271, 230	24, 564, 690

XX.—IMPORTS AND EXPORTS OF GOLD AND SILVER, ETC.—Continued.

DOMESTIC EXPORTS.

Port.	BULLION.						Total gold and silver bullion.
	GOLD.			SILVER.			
	United States mint or assay office bars.	Other bullion.	Total.	United States mint or assay office bars.	Other bullion.	Total.	
NEW YORK, N. Y.							
January		$500	$500		$3, 685, 828	$3, 685, 828	$3, 686, 328
February		800	800		3, 125, 529	3, 125, 529	3, 126, 329
March					2, 502, 808	2, 502, 808	2, 502, 808
April		700	700		3, 121, 677	3, 121, 677	3, 122, 377
May					2, 640, 994	2, 640, 994	2, 640, 994
June					1, 887, 924	1, 887, 924	1, 887, 924
July					2, 019, 101	2, 019, 101	2, 019, 101
August					2, 840, 030	2, 840, 030	2, 840, 030
September					2, 447, 543	2, 447, 543	2, 447, 543
October					2, 889, 830	2, 889, 830	2, 889, 830
November					2, 088, 672	2, 088, 672	2, 088, 672
December		103, 000	103, 000		2, 648, 976	2, 648, 976	2, 751, 976
Total		105, 000	105, 000		31, 898, 912	31, 898, 912	32, 003, 912
SAN FRANCISCO, CAL.							
January				$20, 000	371, 400	391, 400	391, 400
February				3, 900	409, 700	413, 600	413, 600
March				2, 250	475, 350	477, 600	477, 600
April				1, 800	571, 696	573, 496	573, 496
May				2, 000	453, 758	455, 758	455, 758
June				3, 780	985, 220	989, 000	989, 000
July					583, 070	583, 070	583, 070
August				12, 800	735, 000	747, 800	747, 800
September				2, 800	433, 300	436, 100	436, 100
October		850	850		824, 800	824, 800	825, 650
November		660	660	23, 700	945, 900	969, 600	970, 260
December		105	105	3, 200	531, 000	534, 200	534, 305
Total		1, 615	1, 615	76, 230	7, 320, 194	7, 396, 424	7, 398, 039
ALL OTHER PORTS.							
January	$11, 517	315	11, 832	3, 880	36	3, 916	15, 748
February	5, 298	315	5, 613	5, 170	17	5, 187	10, 800
March	11, 966	400	12, 366	3, 600	62	3, 662	16, 028
April	5, 709	1, 381	7, 090	3, 083	141	3, 224	10, 314
May	5, 980	312	6, 292	5, 227	66	5, 293	11, 585
June	5, 528		5, 528	2, 212	6, 328	8, 540	14, 068
July		6, 196	6, 196	4, 150	65	4, 215	10, 411
August		312	312	3, 561		3, 561	3, 873
September		12, 342	12, 342	3, 120	611	3, 731	16, 073
October		12, 422	12, 422		6, 700	6, 700	19, 122
November		12, 165	12, 165		5, 594	5, 594	17, 759
December		10, 719	10, 719		2, 546	2, 546	13, 265
Total	45, 998	56, 879	102, 877	34, 003	22, 166	56, 169	159, 046
Total domestic exports (bullion)	45, 998	163, 494	209, 492	110, 233	39, 241, 272	39, 351, 505	39, 560, 997

XX.—IMPORTS AND EXPORTS OF GOLD AND SILVER, ETC.—Continued.

DOMESTIC EXPORTS—Continued.

Port.	COIN.		Total.
	Gold.	Silver.	
NEW YORK, N. Y.			
January	$139,709	....	$139,709
February	140,700	$2,000	142,700
March	3,006,574	....	3,006,574
April	9,068,882	....	9,068,882
May	23,548,375	....	23,548,375
June	20,717,400	180	20,717,580
July	10,849.422	80	10,849,502
August	3,108,900	500	3,109,400
September	8,000	165	8,165
October	1,015,200	....	1,015,200
November	158,438	....	158,438
December	9,515,383	1,025	9,516,408
Total	81,276,983	3,950	81,280,933
SAN FRANCISCO, CAL.			
January	137,377	....	137,377
February	92,670	....	92,670
March	123,177	2,000	125,177
April	62,165	....	62,165
May	16,278	....	16,278
June	19,135	....	19,135
July	61,235	2,000	63,235
August	73,665	....	73,665
September	64,775	1,000	65,775
October	31,547	....	31,547
November	164,635	....	164,635
December	162,772	....	162,772
Total	1,009,431	5,000	1,014,431
ALL OTHER PORTS.			
January	7,594	3,077	10,671
February	8,510	3,818	12.328
March	10,906	19,006	29,912
April	1,157,686	2,329	1,160,015
May	500,860	1,209	502,069
June	1,155,893	2,222	1,158,115
July	2,178,179	2,952	2,181,131
August	202,843	2,247	205,090
September	88,360	3,467	91,827
October	6,945	3,316	10,261
November	15,315	2,169	17,484
December	5,010	4,067	9,077
Total	5,338,101	49,879	5,387,980
Total domestic exports (coin)	87,624,515	58,829	87,683,344

XX.—Imports and Exports of Gold and Silver, etc.—Continued.

FOREIGN EXPORTS.

Port.	BULLION.		Total.
	Gold.	Silver.	
NEW YORK, N. Y.			
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			
Total			
SAN FRANCISCO, CAL.			
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			
Total			
ALL OTHER PORTS.			
January			
February			
March		$60,872	$60,872
April			
May		618	618
June			
July			
August			
September			
October			
November			
December			
Total		61,490	61,490
Total foreign exports (bullion)		61,490	61,490

XX.—Imports and Exports of Gold and Silver, etc.—Continued.

FOREIGN EXPORTS—Continued.

Port.	COIN.		Total.
	Gold.	Silver.	
NEW YORK, N. Y.			
January	$982, 425	$166, 556	$1, 148, 981
February	2, 960, 942	178, 829	3, 139, 771
March	867, 610	114, 970	982, 580
April	1, 427, 248	58, 234	1, 485, 482
May	3, 334, 996	208, 708	3, 543, 704
June	1, 382, 264	82, 073	1, 464, 337
July	1, 135, 169	170, 715	1, 305, 884
August	1, 732, 931	235, 684	1, 968, 615
September	64, 000	274, 001	338, 001
October	15, 850	97, 900	113, 750
November	77, 000	38, 323	115, 323
December	5, 400	98, 983	104, 383
Total	13, 985, 835	1, 724, 976	15, 710, 811
SAN FRANCISCO, CAL.			
January		437, 844	437, 844
February		371, 254	371, 254
March		227, 477	227, 477
April		327, 178	327, 178
May		445, 297	445, 297
June		395, 702	395, 702
July		415, 601	415, 601
August		575, 763	575, 763
September		807, 130	807, 130
October		537, 972	537, 972
November		467, 538	467, 538
December		372, 432	372, 432
Total		5, 381, 188	5, 381, 188
ALL OTHER PORTS.			
January		153, 378	153, 378
February	82	34, 552	34, 634
March		81, 518	81, 518
April		10, 073	10, 073
May		11, 502	11, 502
June		16, 403	16, 403
July		16, 651	16, 651
August		6, 141	6, 141
September		21, 862	21, 862
October		48, 196	48, 196
November		36, 882	36, 882
December		29, 059	29, 059
Total	82	466, 217	466, 299
Total foreign exports (coin)	13, 985, 917	7, 572, 381	21, 558, 298

XX.—IMPORTS AND EXPORTS OF GOLD AND SILVER, ETC.—Continued.

RECAPITULATION.

Description.	IMPORTS.	EXPORTS.	Excess of—	
			Imports.	Exports.
GOLD.				
Domestic bullion		$209, 492		$209, 492
Foreign bullion	$2, 314, 101		$2, 314, 101	
Foreign coin	14, 610, 965	13, 985, 917	625, 048	
Total	16, 925, 066	14, 195. 409	2, 729, 657	
United States coin	3, 682, 495	87, 624, 515		83, 942, 020
Total bullion and coin	20, 607, 561	101, 819, 924		81, 212, 363
SILVER.				
Domestic bullion		39, 351, 505		39, 351, 505
Foreign bullion	3, 553, 178	61, 490	3, 491, 688	
Foreign coin	6, 177, 115	7, 572, 381		1, 395, 266
Total	9, 730, 293	46, 985, 376		37, 255, 083
United States coin	94, 115	58, 829	35, 286	
Total bullion and coin	9, 824, 408	47, 044, 205		37, 219, 797
Grand total gold and silver	30, 431, 969	148, 864, 129		118, 432, 160

XXI.—VALUE OF GOLD AND SILVER ORES IMPORTED INTO AND EXPORTED FROM THE UNITED STATES DURING THE YEAR ENDED DECEMBER 31, 1894.

IMPORTS.

Month.	NEW YORK.		CORPUS CHRISTI.		PASO DEL NORTE.		SALURIA.	
	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.
January	....	$49, 132	$3, 592	$76, 187	$10, 814	$260, 618	$2, 318	$28, 570
February	....	8, 295	1, 804	73, 555	17, 071	272, 772	....	40, 156
March	....	10, 861	5, 376	46, 078	19, 492	204, 695	....	24, 392
April	....	17, 371	4, 940	39, 409	23, 708	300, 740	....	30, 902
May	....	7, 650	7, 713	90, 028	43, 511	267, 726	....	26, 325
June	....	10, 403	8, 911	57, 165	17, 995	200, 295	....	41, 223
July	$10, 334	417, 887	13, 608	129, 929	26, 277	222, 700	....	23, 736
August	20, 382	586, 326	3, 552	25, 336	43, 423	210, 786	....	....
September	16, 923	412, 394	2, 223	12, 944	14, 621	178, 995	....	....
October	16, 980	155, 602	4, 729	9, 772	25, 082	220, 080	5, 170	....
November	6, 696	332, 304	954	27, 344	9, 355	161, 455	....	....
December	13, 371	642, 687	798	9, 501	12, 860	152, 445	....	....
Total	84, 686	2, 650, 912	58, 200	597, 248	264, 209	2, 653, 307	7, 488	215, 304

Month.	ARIZONA.		PUGET SOUND.		SAN DIEGO.		SAN FRANCISCO.	
	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.
January	$8, 232	$21, 629	$360	$4, 077	....	$234	$1, 832	$110, 700
February	17, 216	81, 938	....	12, 132	....	....	....	102, 800
March	40, 378	73, 048	218	46, 795	....	....	12, 320	92, 711
April	16, 397	60, 992	110	25, 817	$360	....	....	103, 923
May	17, 633	74, 793	....	33, 839	310	....	....	81, 852
June	16, 869	44, 494	34, 114	48, 150	....	....	1, 720	22, 863
July	17, 283	40, 219	4, 795	358	....	....	8, 946	34, 289
August	21, 257	73, 823	2, 998	1, 650	....	100	5, 465	25, 104
September	14, 768	33, 680	4, 754	3, 464	....	....	40	7, 246
October	20, 238	46, 676	1, 128	7, 443	....	....	507	24, 831
November	20, 316	79, 755	8, 138	20, 617	....	....	212	32, 204
December	16, 541	40, 936	10, 910	17, 301	300	....	92	30, 160
Total	227, 128	671, 983	67, 525	221, 643	970	334	31, 134	668, 683

Month.	MONTANA AND IDAHO.		OMAHA.		ALL OTHER PORTS.		Total.	
	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.
January	....	....	....	....	....	....	$27, 148	$551, 147
February	....	....	....	....	....	....	36, 091	591, 648
March	....	....	....	....	....	....	77, 784	498, 580
April	....	....	....	....	....	....	45, 515	579, 154
May	....	....	....	....	....	$995	69, 167	583, 208
June	....	....	....	....	$700	....	80, 309	424, 593
July	....	....	....	....	....	....	81, 243	869, 118
August	....	$10, 634	....	....	6	....	97, 083	933, 759
September	....	....	....	....	....	....	53, 329	648, 723
October	....	....	....	$42, 303	....	....	73, 834	506, 707
November	....	....	....	39, 242	500	....	46, 171	692, 921
December	....	....	$500	36, 598	....	....	55, 372	929, 628
Total	....	10, 634	500	118, 143	1, 206	995	743, 046	7, 809, 186

XXI.—VALUE OF GOLD AND SILVER ORES IMPORTED INTO AND EXPORTED FROM THE UNITED STATES DURING THE YEAR ENDED DECEMBER 31, 1894—Continued.

EXPORTS.

Month.	DOMESTIC EXPORTS.					Total.
	Gold and silver bearing ores.					
	Boston.	Newport News.	New York.	Puget Sound.	Vermont.	
January	$10, 000		$2, 700	$25	$34	$12, 759
February						
March			31, 300			31, 300
April	458		42, 300			42, 758
May			40, 637			40, 637
June			1, 500			1, 500
July			12, 594			12, 594
August			2, 200			2, 200
September						
October						
November			3, 667			3, 667
December		$15	2, 071			2, 086
Total	10, 458	15	138, 969	25	34	149, 501

Month.	FOREIGN EXPORTS.						Total.	
	New York.		Galveston.		New Orleans.			
	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.
January			$4, 771	$13, 495			$4, 771	$13, 495
February		$14, 850	2, 035	5, 554			2, 035	20, 404
March			632	1, 407			632	1, 407
April					$981	$1, 876	981	1, 876
May					1, 623	3, 639	1, 623	3, 639
June								
July					3, 446	7, 418	3, 446	7, 418
August					2, 288	6, 115	2, 288	6, 115
September					3, 552	8, 230	3, 552	8, 230
October								
November								
December								
Total		14, 850	7, 438	20, 456	11, 890	27, 278	19, 328	62, 584

XXII.—IMPORTS OF GOLD AND SILVER INTO THE UNITED STATES, BY COUNTRIES, DURING THE YEAR ENDED DECEMBER 31, 1894.

Countries from which imported.	GOLD.			
	Ore.	Bullion.	United States coin.	Foreign coin.
Azores and Madeira Islands	...	...	$68, 545	$1, 295
France	...	$2, 702	38, 600	6, 269, 068
Germany	...	...	5, 058	1, 577, 999
Gibraltar	...	...	...	...
Netherlands	...	...	1, 015	...
Portugal	...	...	2, 675	...
United Kingdom:				
England	...	...	984, 207	1, 713, 954
British Honduras	...	11, 225	2, 000	...
Dominion of Canada:				
Nova Scotia, New Brunswick, etc	$700	...	522	...
Quebec, Ontario, etc	506	21, 182	795, 832	821, 036
British Columbia	68, 025	326, 883	4, 604	...
Central American States:				
Costa Rica	...	1, 650	4, 000	...
Guatemala	...	6, 660	44, 142	...
Honduras	...	43, 730	...	...
Nicaragua	105	121, 425	4, 960	987
Salvador	...	4, 287	33, 750	...
Mexico	673, 583	1, 064, 721	169, 058	38, 376
Miquelon, Langley, etc	...	...	...	...
West Indies:				
British	...	...	159, 005	1, 965
Danish	...	...	39, 801	11, 943
Dutch	...	...	92, 887	1, 312
French	...	...	1, 086	...
Haiti	...	...	59, 130	...
Santo Domingo	...	...	4, 412	32
Spanish West Indies:				
Cuba	...	10, 500	464, 031	3, 608, 161
Puerto Rico	...	400	2, 736	3, 342
Brazil	...	...	3, 183	730
Chile	77	...	...	...
Colombia	50	420, 882	357, 696	11, 005
Ecuador	...	985	300	...
The Guianas:				
British	...	10, 850	...	...
Dutch	...	23, 056	...	...
Peru	...	...	...	...
Venezuela	...	4, 504	305, 062	56, 240
China	...	...	16, 655	...
Japan	...	...	13, 700	...
British Australasia	...	238, 459	3, 843	493, 260
French Oceanica	...	...	...	260
Hawaiian Islands	...	...	...	...
Total	743, 046	2, 314, 101	3, 682, 495	14, 610, 965

XXII.—Imports of Gold and Silver into the United States, by Countries, during the Year ended December 31, 1894—Continued.

Countries from which imported.	SILVER.					Total, including ore.
	Ore.	Bullion.		United States coin.	Foreign coin.	
		Ounces.				
Azores and Madeira Islands				$199		$70, 039
France		110	$68	124	$22, 565	6, 333, 127
Germany				5, 357	3, 325	1, 591, 739
Gibraltar				75		75
Netherlands				1, 000		2, 015
Portugal						2, 675
United Kingdom:						
England	$1, 033			7, 961	18, 872	2, 726, 027
British Honduras					328, 518	341, 743
Dominion of Canada:						
Nova Scotia, New Brunswick, etc				700		1, 922
Quebec, Ontario, etc		11, 317	6, 940	41, 268	198, 273	1, 885, 037
British Columbia	351, 415	8, 436	5, 905			756, 832
Central American States:						
Costa Rica					400	6, 050
Guatemala					4, 485	55, 287
Honduras		45, 376	23, 160		17, 480	84, 370
Nicaragua		80	50	2, 297	3, 327	133, 151
Salvador						38, 037
Mexico	7, 411, 304	5, 329, 092	3, 162, 767	1, 362	4, 772, 304	17, 293, 475
Miquelon, Langley, etc					4, 175	4, 175
West Indies:						
British				8, 872	18, 403	188, 245
Danish				2, 200	14, 785	68, 729
Dutch				4, 709	3, 721	102, 629
French						1, 086
Haiti				318	5, 185	64, 633
Santo Domingo					344, 900	349, 344
Spanish West Indies:						
Cuba		3, 408	2, 200	6, 456	37, 789	4, 129, 137
Puerto Rico				1, 027	210, 774	218, 279
Brazil						3, 913
Chile		17, 500	11, 500		39, 612	51, 189
Colombia	2, 090	578, 123	340, 465	9, 018	110, 647	1, 251, 853
Ecuador		200	123	30	168	1, 606
The Guianas:						
British						10, 850
Dutch				31		23, 087
Peru	43, 344				8, 477	51, 821
Venezuela						365, 806
China					132	16, 787
Japan				1, 000		14, 700
British Australasia						735, 562
French Oceanica				111	3, 798	4, 169
Hawaiian Islands					5, 000	5, 000
Total	7, 809, 186	5, 993, 642	3, 553, 178	94, 115	6, 177, 115	38, 984, 201

XXIII.—EXPORTS OF DOMESTIC GOLD AND SILVER, BY COUNTRIES, DURING THE YEAR ENDED DECEMBER 31, 1894.

Countries to which exported.	GOLD.			SILVER.
	Bars bearing the stamp of a United States mint or assay office.	Other bullion.	Coin.	Gold and silver bearing ore.
Belgium				
France		$103,000	$30,079,000	
Germany			35,950,000	$27,347
Netherlands			725,000	
United Kingdom:				
England		1,300	15,103,500	122,095
British Honduras			15,000	
Dominion of Canada:				
Nova Scotia, New Brunswick, etc				
Quebec, Ontario, etc	$45,998	56,354	3,131,842	34
British Columbia		525	18,089	25
Central American States:				
Guatemala			230,180	
Honduras			2,000	
Nicaragua			3,000	
Salvador			86,900	
Mexico			25,190	
Miquelon, Langley, etc			4,000	
West Indies:				
British			29,015	
Dutch			1,000	
French			9,375	
Haiti			525,872	
Santo Domingo			2,382	
Spanish West Indies:				
Cuba		700	450,000	
Puerto Rico			5,000	
Brazil			332	
Colombia			58,082	
The Guianas:				
British			500	
Dutch			6,900	
Venezuela			470,025	
China				
Hongkong		1,615	90,346	
Japan				
Hawaiian Islands			601,985	
Liberia				
Total	45,998	163,494	87,624,515	149,501

XXIII.—EXPORTS OF DOMESTIC GOLD AND SILVER, BY COUNTRIES, DURING THE YEAR ENDED DECEMBER 31, 1894—Continued.

Countries to which exported.	SILVER.					Total, including ore.
	Bars bearing the stamp of a United States mint or assay office.		Other bullion.		Coin.	
	Ounces.		*Ounces.*			
Belgium			131, 077	$85, 000		$85, 000
France			296, 191	201, 000		30, 383, 000
Germany			249, 110	159, 500		36, 136, 847
Netherlands						725. 000
United Kingdom:						
England			48, 165, 832	30, 880, 321		46. 107, 216
British Honduras						15, 000
Dominion of Canada:						
Nova Scotia, New Brunswick, etc.			265	195		195
Quebec, Ontario, etc	53, 988	$34, 003	24, 927	15, 629	$20, 323	3, 304, 183
British Columbia					9, 818	28, 457
Central American States:						
Guatemala			484, 458	306, 482		536, 662
Honduras						2, 000
Nicaragua						3, 000
Salvador						86, 900
Mexico			18, 703	11, 402	18, 738	55, 330
Miquelon, Langley, etc						4, 000
West Indies:						
British					1, 605	30, 620
Dutch						1, 000
French						9, 375
Haiti					2, 000	527, 872
Santo Domingo						2, 382
Spanish West Indies:						
Cuba					1, 180	451, 880
Puerto Rico						5, 000
Brazil						332
Colombia			581, 458	369. 773		427, 855
The Guianas:						
British						500
Dutch						6, 900
Venezuela						470, 025
China			1, 543, 000	978, 300		978, 300
Hongkong	49, 800	31, 880	2, 232, 789	1, 395, 420		1, 519, 261
Japan	68, 022	44, 350	7, 715, 838	4, 838, 250		4, 882, 600
Hawaiian Islands					5, 000	606, 985
Liberia					165	165
Total	171, 810	110, 233	61, 443, 648	39, 241, 272	58, 829	127, 393, 842

XXIV.—EXPORTS OF FOREIGN GOLD AND SILVER, BY COUNTRIES, DURING THE YEAR ENDED DECEMBER 31, 1894.

Countries to which exported.	GOLD.			SILVER.				Total, including ore.
	Ore.	Bullion.	Coin.	Ore.	Bullion.		Coin.	
					Ounces.			
France			$1,977,000				$1,500	$1,978,500
Germany			7,000	$56				7,056
Spain							1,000	1,000
United Kingdom:								
England	$19,328		134,000	62,528			1,124,075	1,339,931
Bermuda			102,285					102,285
British Honduras							100	100
Dominion of Canada:								
Quebec, Ontario, etc			82				96,218	96,300
Central American States:								
Guatemala							1,940	1,940
Honduras							13,501	13,501
Nicaragua							7,295	7,295
Salvador			4,760				95,045	99,805
Mexico					113,310	$61,490	424,450	485,940
Miquelon, Langley, etc							3,075	3,075
West Indies:								
British			1,282				2,895	4,177
Haiti							15,975	15,975
Santo Domingo			20,757				212,310	233,067
Spanish West Indies:								
Cuba			11,722,451				44,145	11,766,596
Argentine Republic							100	100
Brazil			4,900				88,197	93,097
Colombia			10,600				121,994	132,594
Venezuela			800				1,323	2,123
Hongkong							4,609,343	4,609,343
Japan							706,700	706,700
Portuguese Africa							1,200	1,200
Total	19,328		13,985,917	62,584	113,910	61,490	7,572,381	21,701,700

XXV.—GOLD AND SILVER BARS FURNISHED FOR USE IN MANUFACTURES AND THE ARTS, AND CLASSIFICATION OF THE MATERIAL USED, DURING THE CALENDAR YEARS 1880–1894.

GOLD.

Calendar year.	United States coin.	New material.	Old material.	Foreign bullion and coin.	Total.
1880	$3,300,000	$6,000,000	$395,000	$1,267,600	$10,962,600
1881	2,700,000	7,000,000	522,900	1,547,800	11,770,700
1882	2,500,000	7,000,000	696,500	671,500	10,868,000
1883	4,875,000	7,840,000	1,549,300	194,500	14,458,800
1884	5,000,000	6,000,000	3,114,500	385,500	14,500,000
1885	3,500,000	6,736,927	1,408,902	178,913	11,824,742
1886	3,500,000	7,003,480	1,928,046	638,003	13,069,529
1887	3,500,000	9,090,342	1,835,882	384,122	14,810,346
1888	3,500.000	9,893,057	2,402,976	718,809	16,514,842
1889	3,500,000	9,686,827	3,218,971	291,258	16,697,056
1890	3,500,000	10,717,472	3,076.426	362,062	17,655,960
1891	3,500,000	10,697,679	4,860,712	628,525	19,686,916
1892	3,500,000	10,588,703	4,468,685	771,686	19,329,074
1893	1,500,000	8,354,482	2,777,165	804,254	13,435,901
1894	1,500,000	6,430,073	2,184,946	543,585	10,658,604
Total	49,375,000	123,039,042	34,440,911	9,388,117	216,243,070

SILVER.

Calendar year.	United States coin.	New material.	Old material.	Foreign bullion and coin.	Total.
1880	$600,000	$5,000,000	$145,000	$353,000	$6,098,000
1881	200,000	5,900,000	178,000	371,000	6,649,000
1882	200,000	6,344,300	212,900	440,300	7,197,500
1883	200,000	4,623,700	561,900	155,000	5,540,600
1884	200,000	4,500,000	170,000	650,000	5,520,000
1885	200,000	4,539,875	462,186	62,708	5,264,769
1886	200,000	3,626,195	404,155	825,615	5,055,965
1887	200,000	4,102,734	480,606	654,991	5,438,331
1888	200,000	6,477,857	652,047	771,985	8,101,889
1889	200,000	7,297,933	611,015	657,997	8,766,945
1890	200,000	7,143,635	640,100	1,245,419	9,229,154
1891	200,000	7,289,073	858,126	1,256,101	9,603,300
1892	200,000	7,204,210	647,377	1,249,801	9,301,388
1893	100,000	6,570,737	1,222,836	1,740,704	9,634,277
1894	100,000	8,579,472	1,221,177	982,399	10,883,048
Total	3,200,000	89,199,721	8,467,425	11,417,020	112,284,166

XXVI.—COINAGE OF NATIONS.

Countries.	1892.		1893.		1894.	
	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.
United States	$34,787,223	$12,641,078	$56,997,020	$8,802,797	$79,546,160	$9,200,351
Mexico	275,203	26,782,721	493,167	28,005,396	554,107	29,481,033
Great Britain	67,682,503	3,790,673	45,094,210	5,296,728	27,633,807	4,002,657
Australasia	30,784,262		32,059,354		35,203,648	
India[1]		52,258,747		39,544,591		3,405,503
France	871,225		9,832,068		1,897.395	772,000
Germany	8,863,874	1,237,864	26,280,188	2,093,713	37,433,154	1,067,945
Russia[2]	555,909	2,920,484	2,315,493	2,499,874		
Finland						41,365
Austria-Hungary	[3] 14,038,714	[3] 5,315,069	[4] 55,932,881	[4] 18,073.120	[4] 40,395,456	[4] 10,420,887
Italy	130,105	22,997	159,086			
Spain	9,381,062	8,917,860		3,290,591		3,946.225
Japan	1,319,525	12,307,062	1,306,070	12,300,705	1,576,440	24,131,363
Portugal		3,075,840		1,412,640		478,440
Netherlands	245	1,567,800		562,800	70,897	160,800
Norway		120,600		134,000		107,200
Sweden		78,996		26,171	165,239	46,443
Denmark		242,207				121,593
Switzerland	386,000		386,000		465,516	579,000
Turkey	140,672	883,464	736,989	874.628	84,403	450,018
Egypt		649,555	622,818	537,114		
Abyssinia						30,759
Persia			136,320	255,600		
Hongkong		1,100,000		1,500,000		2,100,000
China		3,500,000		4,249,960		6,000,000
Indo-China		57,900		939,906		1,532,087
Tunis	3,231,905	471,131	134,004	347	232	347
Canada		298,000		160,000		144,518
Newfoundland						58,000
Costa Rica		138,091		155.000		12,517
Haiti						718,753
Bolivia		1,435,543		1,569,229		
Peru		2,614,948				
Colombia		2,378,272		34,530		8,252
Ecuador		60,000				83,308
Venezuela				193,000		193,000
Chile				481,405		121,779
Uruguay				1,000,110		
Guatemala				100,000		3,561,988
British Honduras						50,000
British West Indies						9,733
German East Africa		364,814		45,348		93,097
German New Guinea						47,608
South African Republic	24,697	49,519				
Straits Settlements				194,000		306,000
Congo State						96,500
Morocco		858,808		557,750		327,337
Bulgaria		2,509,198			579,097	2,316,224
Roumania						579,000
Ceylon		236,850		473,700		142,110
Siam		6,631,256				
Korea				25,000		
Total	172,473.124	155,517,347	232,485,668	135,389,753	225,605,551	106,945,740

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[1] Rupee calculated at coining rate, $0.4737. [2] Silver ruble calculated at coining rate, $0.7718. [3] Silver florin calculated at coining rate, $0.482. [4] Florin calculated at coining rate, $0.4052, under the coinage act of August 2, 1892.

XXVII.—World's Production of Gold and

[Kilogram of gold, $664.60; kilogram of silver, $41.56,

	Countries.	1892.			
		GOLD.		SILVER.	
		Kilos.	*Dollars.*	*Kilos.*	*Dollars.*
1	United States	49,654	33,000,000	1,975,481	82,101,000
2	Australasia	51,398	34,159,000	418,087	17,375,700
3	Mexico	1,699	1,129,200	1,228,994	51,077,000
	European countries:				
4	Russia	37,325	24,806,200	14,478	601,700
5	Germany	3,141	2,087,600	212,116	8,815,600
6	Austria-Hungary	2,260	1,502,000	55,082	2,289,200
7	Sweden	88	58,500	53	2,200
8	Norway	----------	----------	4,495	186,800
9	Italy	137	91,400	39,853	1,656,300
10	Spain	----------	----------	[1]46,279	1,923,400
11	Greece	----------	----------	[6]2,025	84,200
12	Turkey	[6]10	7,000	[6]6,334	263,200
13	France	195	129,700	92,700	3,852,600
14	Great Britain	77	51,200	5,270	219,000
15	Dominion of Canada	[1]1,365	907,600	[1]10,748	446,700
	South American countries:				
16	Argentine Republic	[3]123	82,000	[4]14,918	620,000
17	Colombia	[4]5,224	3,472,000	[4]40,871	1,698,600
18	Bolivia	101	[1]67,000	333,355	13,854,200
19	Ecuador	[6]79	52,000	[6]240	10,000
20	Chile	908	603,800	100,797	4,189,100
21	Brazil	3,339	2,219,500	----------	----------
22	Venezuela	1,213	806,100	----------	----------
23	Guiana (British)	3,609	2,398,900	----------	----------
24	Guiana (Dutch)	[1]1,074	713,800	----------	----------
25	Guiana (French)	[4]1,502	998,200	----------	----------
26	Peru	[4]110	73,000	59,257	2,462,700
27	Uruguay	[1]213	141,600	----------	----------
28	Central American States	[4]246	163,500	48,123	[2]2,000,000
29	Japan	[7]770	511,700	[7]54,986	2,285,200
30	China	12,678	[1]8,426,000	----------	----------
31	Africa	36,461	24,232,000	----------	----------
32	India (British)	4,993	3,318,300	----------	----------
33	Korea	918	606,300	----------	----------
	Total	220,910	146,815,100	4,764,542	198,014,400

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[1] Estimate of the Bureau of the Mint.
[2] Estimated the same as officially communicated for 1887.
[3] Estimated the same as officially communicated for 1890.
[4] Estimated the same as officially communicated for 1891.
[6] Estimated the same as officially communicated for 1892.

SILVER, CALENDAR YEARS 1892, 1893, AND 1894.

coining rate in United States silver dollars.]

1893.				1894.				
GOLD.		SILVER.		GOLD.		SILVER.		
Kilos.	*Dollars.*	*Kilos.*	*Dollars.*	*Kilos.*	*Dollars.*	*Kilos.*	*Dollars.*	
54, 100	35, 955, 000	1, 866, 595	77, 575, 700	59, 434	39, 500, 000	1, 539, 942	64, 000, 000	1
53, 698	35, 688, 600	637, 800	26, 507, 000	62, 836	41, 760, 800	562, 263	23, 367, 700	2
1, 964	1, 305, 300	1, 380, 116	57, 357, 600	6, 771	[1]4, 500, 000	1, 463, 361	60, 817, 300	3
41, 842	27, 808, 200	10, 117	420, 500	36, 313	24, 133, 400	8, 580	356, 600	4
2, 255	1, 498, 900	198, 270	8, 240, 100	2, 255	[6]1, 498, 900	198, 270	[6]8, 240, 100	5
2, 535	1, 684, 800	61, 319	2, 548, 400	[6]2, 535	1, 684, 800	[6]61, 319	2, 548, 400	6
93	62, 000	4, 471	185, 800	94	62, 500	2. 869	119, 200	7
....	....	[5]4, 495	186, 800	....	....	4, 705	195, 500	8
176	117, 000	28, 885	1, 200, 500	[6]176	117, 000	[6]28, 885	1, 200, 500	9
....	....	62, 632	2, 603, 000	....	....	63. 605	2, 643, 400	10
....	....	2, 025	84, 200	....	....	35, 436	1, 472, 700	11
10	7, 000	6, 334	263, 200	12	8, 000	1, 516	63, 000	12
279	185, 300	98, 077	4, 076, 100	[6]279	185, 300	[6]98, 077	4, 076, 100	13
64	42, 300	7, 886	327, 700	99	65, 800	7, 932	329, 700	14
[1]1, 395	927. 200	[1]7, 734	321, 400	1, 568	1, 042, 100	26, 371	1, 096, 000	15
211	140, 200	22, 026	915, 400	143	95, 000	37, 334	1. 551, 600	16
4, 353	2, 892, 800	52, 511	2, 182, 400	[6]4, 353	2, 892, 800	[6]52, 511	2, 182, 400	17
101	67, 000	424, 074	17, 624, 500	101	[1]67, 000	684, 418	28, 444, 400	18
79	52, 000	240	10, 000	103	68, 400	[6]240	10, 000	19
698	464, 400	97, 333	4, 045, 200	698	[6]464, 400	88, 680	3, 685, 500	20
3, 339	2, 219, 500	....	....	3, 339	2, 219, 500	....	....	21
[5]1, 213	806, 100	....	....	1, 281	851, 600	....	....	22
3, 863	2, 567, 400	....	....	3, 476	2, 310, 100	....	....	23
[1]1, 065	707, 800	....	....	979	[1]650, 800	....	....	24
[4]1, 502	998, 200	....	....	2, 000	1, 329, 200	....	....	25
[4]110	73, 000	[5]59, 257	2, 462, 700	112	74, 400	107, 670	4, 474, 800	26
[1]213	141. 600	....	....	[1]213	141, 600	....	....	27
[4]246	163, 500	48, 123	[2]2, 000, 000	708	470, 500	48, 123	[2]2, 000, 000	28
[8]728	484, 000	[8]57, 978	2, 409, 600	[9]737	489, 800	[9]60, 869	2, 529, 700	29
10, 372	[1]6. 892, 900	....	....	12, 875	[1]8, 556, 800	....	....	30
43, 550	28, 943, 500	....	....	60, 595	40, 271, 000	....	....	31
5, 738	3, 813, 600	....	....	5, 999	3, 986, 900	....	....	32
884	587, 900	....	....	703	467, 200	....	....	33
236, 676	157, 297, 000	5. 138, 298	213, 547, 800	270, 787	179, 965, 600	5, 182, 976	215, 404, 600	

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[6] Estimated the same as officially communicated for 1893.
[7] Product of Imperial mines, 1892; private mines, 1890.
[8] Product of Imperial mines, 1893; private mines, 1891.
[9] Product of Imperial mines, 1894; private mines, 1892.

XXVIII.—World's Production of Gold and

[Fine ounce of gold, $20.671834+; fine ounce of silver

	Countries.	1892.			
		GOLD.		SILVER.	
		Ozs., fine.	*Dollars.*	*Ozs., fine.*	*Dollars.*
1	United States	1,596,375	33,000.000	63,499,992	82,101,000
2	Australasia	1,652,442	34,159,000	13.439,018	17,375,700
3	Mexico	54,625	1,129,200	39,504,867	51 077,000
	European countries:				
4	Russia	1,200,000	24,806,200	465.377	601,700
5	Germany	100,987	2,087,600	6,818,316	8,815,600
6	Austria-Hungary	72,659	1,502,000	1,770,553	2,289,200
7	Sweden	2,830	58,500	1,702	2,200
8	Norway			144,478	186,800
9	Italy	4,421	91,400	1.281,045	1,656,300
10	Spain			[1] 1,487,630	1,923,400
11	Greece			6 65,123	84,200
12	Turkey	[6] 339	7,000	[6] 203,569	263,200
13	France	6,274	129,700	2,979,745	3,852,600
14	Great Britain	2,477	51,200	169,383	219,000
15	Dominion of Canada	[1] 43,905	907,600	[1] 345,495	446,700
	South American countries:				
16	Argentine Republic	[3] 3,967	82,000	[4] 479,531	620,000
17	Colombia	[4] 167,958	3,472,000	[4] 1,313,761	1,698,600
18	Bolivia	3,241	[1] 67,000	10,715,358	13,854,200
19	Ecuador	[6] 2,515	52,000	[6] 7,734	10,000
20	Chile	29,209	603,800	3,240.007	4,189,100
21	Brazil	107,368	2,219,500		
22	Venezuela	38,995	806,100		
23	Guiana (British)	116,047	2,398,900		
24	Guiana (Dutch)	[1] 34,530	713,800		
25	Guiana (French)	[4] 48,288	998,200		
26	Peru	[4] 3,531	73,000	1,904,744	2,462,700
27	Uruguay	[1] 6,850	141,600		
28	Central American States	[4] 7,909	163,500	1,546,875	[2] 2,000,000
29	Japan	[7] 24,754	511,700	[7] 1,767,459	2,285,200
30	China	407,608	[1] 8,426,000		
31	Africa	1,172,223	24,232,000		
32	India (British)	160,523	3,318,300		
33	Korea	29,330	606,300		
	Total	7,102,180	146,815,100	153,151.762	198,014,400

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[1] Estimate of the Bureau of the Mint.
[2] Estimated the same as officially communicated for 1887.
[3] Estimated the same as officially communicated for 1890.
[4] Estimated the same as officially communicated for 1891.
[5] Estimated the same as officially communicated for 1892.

SILVER, CALENDAR YEARS 1892, 1893, AND 1894.

$1.292929+, coining rate in United States silver dollars.]

1893.				1894.				
GOLD.		SILVER.		GOLD.		SILVER.		
Ozs., fine.	*Dollars.*	*Ozs., fine.*	*Dollars.*	*Ozs., fine.*	*Dollars.*	*Ozs., fine.*	*Dollars.*	
1, 739, 323	35, 955, 000	59, 999, 936	77, 575, 700	1, 910, 813	39, 500, 000	49, 500, 000	64, 000, 000	1
1, 726, 436	35, 688, 600	20, 501, 508	26, 507, 000	2, 020, 179	41, 760, 800	18, 073, 455	23, 367, 700	2
63, 144	1, 305, 300	44, 362, 519	57. 357, 600	217, 688	[1] 4, 500, 000	47, 038, 381	60, 817, 300	3
1, 345, 222	27, 808. 200	325, 230	420, 500	1, 167, 453	24, 133, 400	275, 808	356, 600	4
72, 509	1, 498, 900	6, 373, 202	8, 240, 100	72, 509	[6] 1, 498, 900	6, 373, 202	[6] 8, 240, 100	5
81, 502	1, 684, 800	1, 971, 028	2, 548, 400	[6] 81, 502	1, 684, 800	[6] 1, 971, 028	2, 548, 400	6
2, 999	62, 000	143, 705	185, 800	3, 024	62, 500	92, 194	119, 200	7
....	....	[5] 144, 478	186, 800	....	....	151, 207	195, 500	8
5, 660	117, 000	928, 512	1, 200, 500	[6] 5, 660	117, 000	[6] 928, 512	1, 200, 500	9
....	....	2, 013, 258	2, 603, 000	....	....	2, 044, 505	2, 643, 400	10
....	....	65, 123	84, 200	....	....	1, 139, 041	1, 472, 700	11
339	7, 000	203, 569	263, 200	387	8, 000	48, 727	63, 000	12
8, 964	185, 300	3, 152, 609	4, 076, 100	[6] 8, 964	185, 300	[6] 3, 152, 609	4, 076, 100	13
2, 046	42, 300	253, 455	327, 700	3, 183	65, 800	255, 002	329, 700	14
[1] 44, 853	927, 200	[1] 248, 583	321, 400	50, 411	1, 042, 100	847, 687	1, 096, 000	15
6, 782	140, 200	708, 005	915, 400	4, 596	95, 000	1, 200, 066	1, 551, 600	16
139, 939	2, 892, 800	1, 687, 950	2, 182. 400	[6] 139, 939	2, 892, 800	[6] 1, 687, 950	2, 182, 400	17
3, 241	[1] 67, 000	13, 631, 449	17, 624, 500	3, 241	[1] 67, 000	21, 999, 966	28, 444, 400	18
2, 515	52, 000	7, 734	10, 000	3, 309	68, 400	[6] 7, 734	10, 000	19
22, 466	464, 400	3, 128, 709	4, 045, 200	22, 466	[6] 464, 400	2, 850, 503	3, 685, 500	20
107, 368	2, 219, 500	....	....	107, 368	2, 219, 500	....	....	21
[5] 38, 995	806, 100	....	....	41, 196	851, 600	....	....	22
124, 198	2, 567, 400	....	....	111, 751	2, 310, 100	....	....	23
[1] 34, 240	707, 800	....	....	[1] 31, 482	650, 800	....	....	24
[4] 48, 288	998, 200	....	....	64, 300	1, 329, 200	....	....	25
[4] 3, 531	73, 000	[5] 1, 904, 744	2, 462, 700	3, 599	74, 400	3, 460, 978	4, 474, 800	26
[1] 6, 850	141, 600	....	....	[1] 6, 850	141, 600	....	....	27
[4] 7, 909	163, 500	1, 546, 875	[2] 2, 000, 000	22, 760	470, 500	1, 546, 875	[2] 2, 000, 000	28
[7] 23, 414	484, 000	[8] 1, 863, 675	2, 409, 600	[9] 23, 694	489, 800	[9] 1, 956, 565	2, 529, 700	29
333, 444	[1] 6, 892, 900	....	....	413, 937	[1] 8, 556, 800	....	....	30
1, 400, 142	28, 943, 500	....	....	1, 948, 109	40, 271, 000	....	....	31
184, 483	3, 813, 600	....	....	192, 866	3, 986, 900	....	....	32
28, 440	587, 900	....	....	22, 600	467, 200	....	....	33
7, 609, 242	157, 297, 000	165, 165, 856	213, 547, 800	8, 705, 836	179, 965, 600	166, 601, 995	215, 404, 600	

[6] Estimated the same as officially communicated for 1893.

[7] Product of Imperial mines, 1892; private mines, 1890.

[8] Product of Imperial mines, 1893; private mines, 1891.

[9] Product of Imperial mines, 1894; private mines, 1892.

XXIX.—Production of Gold and Silver in

[From 1493 to 1885 is from a table of averages for certain periods compiled by Dr. Adolph Soetbeer.

Period.	GOLD.			
	Annual average for period.		Total for period.	
	Ounces, fine.	Value.	Ounces, fine.	Value.
1493-1520	186, 470	$3, 855, 000	5, 221, 160	$107, 931, 000
1521-1544	230, 194	4, 759, 000	5, 524, 656	114, 205, 000
1545-1560	273, 596	5, 656, 000	4, 377, 544	90, 492, 000
1561-1580	219, 906	4, 546, 000	4, 398, 120	90, 917, 000
1581-1600	237, 267	4, 905, 000	4, 745, 340	98, 095, 000
1601-1620	273, 918	5, 662, 000	5, 478, 360	113, 248, 000
1621-1640	266, 845	5, 516, 000	5, 336, 900	110, 324, 000
1641-1660	281, 955	5, 828, 000	5, 639, 110	116, 571, 000
1661-1680	297, 709	6, 154, 000	5, 954, 180	123, 084, 000
1681-1700	346, 095	7, 154, 000	6, 921, 895	143, 088, 000
1701-1720	412, 163	8, 520, 000	8, 243, 260	170, 403, 000
1721-1740	613, 422	12, 681, 000	12, 268, 440	253, 611, 000
1741-1760	791, 211	16, 356, 000	15, 824, 230	327, 116, 000
1761-1780	665, 666	13, 761, 000	13, 313, 315	275, 211, 000
1781-1800	571, 948	11, 823, 000	11, 438, 970	236, 464, 000
1801-1810	571, 563	11, 815, 000	5, 715, 627	118, 152, 000
1811-1820	367, 957	7, 606, 000	3, 679, 568	76, 063, 000
1821-1830	457, 044	9, 448, 000	4, 570, 444	94, 479, 000
1831-1840	652, 291	13, 484, 000	6, 522, 913	134, 841, 000
1841-1850	1, 760, 502	36, 393, 000	17, 605, 018	363, 928, 000
1851-1855	6, 410, 324	132, 513, 000	32, 051, 621	662, 566, 000
1856-1860	6, 486, 262	134, 083, 000	32, 431, 312	670, 415, 000
1861-1865	5, 949, 582	122, 989, 000	29, 747, 913	614, 944, 000
1866-1870	6, 270, 086	129, 614, 000	31, 350, 430	648, 071, 000
1871-1875	5, 591, 014	115, 577, 000	27, 955, 068	577, 883, 000
1876-1880	5, 543, 110	114, 586, 000	27, 715, 550	572, 931, 000
1881-1885	4, 794, 755	99, 116, 000	23, 973, 773	495, 582, 000
1886	5, 135, 679	106, 163, 900	5, 135, 679	106, 163, 900
1887	5, 116, 861	105, 774, 900	5, 116, 861	105, 774, 900
1888	5, 330, 775	110, 196, 900	5, 330, 775	110, 196, 900
1889	5, 973, 790	123, 489, 200	5, 973, 790	123, 489, 200
1890	5, 749, 306	118, 848, 700	5, 749, 306	118, 848, 700
1891	6, 320, 194	130, 650, 000	6, 320, 194	130, 650, 000
1892	7, 102, 180	146, 815, 100	7, 102, 180	146, 815, 100
1893	7, 609, 242	157, 297, 000	7, 609, 242	157, 297, 000
1894	8, 705, 836	179, 965, 600	8, 705, 836	179, 965, 600
Total			415, 048, 580	8, 579, 816, 300

THE WORLD SINCE THE DISCOVERY OF AMERICA.

For the years 1886 to 1894 the production is the annual estimate of the Bureau of the Mint.]

SILVER.				PERCENTAGE OF PRODUCTION.			
Annual average for period.		Total for period.		By weight.		By value.	
Ounces, fine.	Coining value	Ounces, fine.	Coining value.	Gold.	Silver.	Gold.	Silver.
1, 511, 050	$1, 954, 000	42, 309, 400	$54, 703, 000	11	89	66. 4	33. 6
2, 899, 930	3, 749, 000	69, 598, 320	89, 986, 000	7. 4	92. 6	55. 9	44. 1
10, 017, 940	12, 952, 000	160, 287, 040	207, 240, 000	2. 7	97. 3	30. 4	69. 6
9, 628. 925	12, 450, 000	192, 578, 500	248, 990, 000	2. 2	97. 8	26. 7	73. 3
13, 467, 635	17, 413. 000	269, 352, 700	348. 254, 000	1. 7	98. 3	22	78
13, 596, 235	17, 579, 000	271, 924, 700	351, 579, 000	2	98	24. 4	75. 6
12, 654, 240	16, 361, 000	253, 084, 800	327, 221, 000	2. 1	97. 9	25. 2	74. 8
11, 776, 545	15, 226, 000	235, 539, 900	304, 525, 000	2. 3	97. 7	27. 7	72. 3
10, 834, 550	14, 008, 000	216, 691, 000	280, 166, 000	2. 7	97. 3	30. 5	69. 5
10, 992, 085	14, 212, 000	219, 841, 700	284. 240, 000	3. 1	96. 9	33. 5	66. 5
11, 432, 540	14, 781, 000	228, 650, 800	295, 629, 000	3. 5	96. 5	36. 6	63. 4
13, 863, 080	17, 924, 000	277, 261, 600	358, 480, 000	4. 2	95. 8	41. 4	58. 6
17, 140, 612	22, 162, 000	342, 812, 235	443, 232, 000	4. 4	95. 6	42. 5	57. 5
20, 985, 591	27, 133, 000	419, 711, 820	542, 658, 000	3. 1	96. 9	33. 7	66. 3
28, 261, 779	36, 540, 000	565, 235, 580	730, 810, 000	2	98	24. 4	75. 6
28, 746, 922	37, 168, 000	287, 469, 225	371, 677, 000	1. 9	98. 1	24. 1	75. 9
17, 385, 755	22, 479, 000	173, 857, 555	224, 786, 000	2. 1	97. 9	25. 3	74. 7
14, 807, 004	19, 144, 000	148, 070, 040	191, 444, 000	3	97	33	67
19, 175, 867	24, 793, 000	191, 758, 675	247, 930, 000	3. 3	96. 7	35. 2	64. 8
25, 090, 342	32, 440, 000	250, 903, 422	324, 400, 000	6. 6	93. 4	52. 9	47. 1
28, 488, 597	36, 824, 000	142, 442, 986	184, 169, 000	18. 4	81. 6	78. 3	21. 7
29, 095, 428	37, 618, 000	145, 477, 142	188, 092, 000	18. 2	81. 8	78. 1	21. 9
35, 401, 972	45, 772, 000	177, 009, 862	228, 861, 000	14. 4	85. 6	72. 9	27. 1
43, 051, 583	55, 663, 000	215, 257, 914	278, 313, 000	12. 7	87. 3	70	30
63, 317, 014	81, 864, 000	316. 585, 069	409, 322, 000	8. 1	91. 9	58. 5	41. 5
78, 775, 602	101, 851, 000	393, 878, 009	509, 256, 000	6. 6	93. 4	53	47
92, 003, 944	118, 955, 000	460, 019, 722	594, 773, 000	5	95	45. 5	54. 5
93, 297, 290	120, 626, 800	93, 297, 290	120, 626, 800	5. 2	94. 8	46. 8	53. 2
96, 123, 586	124, 281, 000	96, 123, 586	124, 281, 000	5	95	45. 9	54. 1
108, 827, 606	140, 706, 400	108, 827, 606	140, 706, 400	4. 6	95. 4	43. 9	56. 1
120, 213, 611	155, 427, 700	120, 213, 611	155, 427, 700	4. 7	95. 3	44. 3	55. 7
126, 095, 062	163, 032, 000	126, 095, 062	163, 032, 000	4. 3	95. 7	42. 1	57. 9
137, 170, 919	177, 352, 300	137, 170, 919	177, 352, 300	4. 4	95. 6	42. 4	57. 6
153, 151, 762	198, 014, 400	153, 151, 762	198, 014, 400	4. 4	95. 6	42. 5	57. 5
165, 165, 876	213, 547, 800	165, 165, 876	213, 547, 800	4. 4	95. 6	42. 4	57. 6
166. 601, 995	215, 404, 600	166, 601, 995	215, 404, 600	4. 9	95. 1	45. 6	54. 4
....	....	7, 834, 248, 423	10, 129, 129, 000	5	95	45. 9	54. 1

XXX.—COINAGE OF THE MINTS OF THE UNITED STATES FROM THEIR ORGANIZATION, 1792, TO DECEMBER 31, 1894.

Denomination.	Pieces.	Value.
GOLD.		
Double eagles	60, 535, 185	$1, 210, 703, 700. 00
Eagles	25, 912, 723	259, 127, 230. 00
Half eagles	42, 584, 335	212, 921, 675. 00
Three-dollar pieces (coinage discontinued under act of September 26, 1890)	539, 792	1, 619, 376. 00
Quarter eagles	11, 472, 402	28, 681, 005. 00
Dollars (coinage discontinued under act of September 26, 1890)	19, 499, 337	19, 499, 337. 00
Total gold	160, 543, 774	1, 732, 552, 323. 00
SILVER.		
Dollars (coinage discontinued, act of February 12, 1873, and resumed under act of February 28, 1878)	430, 457, 987	[1] 430, 457, 987. 00
Trade dollars	35, 965, 924	35, 965, 924. 00
Half dollars	259, 515, 997	129, 757, 998. 50
Half dollars, Columbian souvenir	5, 002, 105	2, 501, 052. 50
Quarter dollars	192, 692, 694	48, 173, 173. 50
Quarter dollars, Columbian souvenir	40, 023	10, 005. 75
Twenty-cent pieces (coinage discontinued, act of May 2, 1878)	1, 355, 000	271, 000. 00
Dimes	286, 101, 713	28, 610, 171. 30
Half dimes (coinage discontinued, act February 12, 1873)	97, 604, 388	4, 880, 219. 40
Three-cent pieces (coinage discontinued, act February 12, 1873)	42, 736, 240	1, 282, 087. 20
Total silver	1, 351, 472, 071	681, 909, 619. 15
MINOR.		
Five-cent pieces, nickel	271, 074, 610	13, 553, 730. 50
Three-cent pieces, nickel (coinage discontinued, act September 26, 1890)	31, 378, 316	941, 349. 48
Two-cent pieces, bronze (coinage discontinued, act February 12, 1873)	45, 601, 000	912, 020. 00
One-cent pieces, copper (coinage discontinued, act February 21, 1857)	156, 288, 744	1, 562, 887. 44
One-cent pieces, nickel (coinage discontinued, act April 22, 1864)	200, 772, 000	2, 007, 720. 00
One-cent pieces, bronze	746, 389, 806	7, 463, 898. 26
Half-cent pieces, copper (coinage discontinued, act February 21, 1857)	7, 985, 222	39, 926. 11
Total minor	1, 459, 489, 698	26, 481, 531. 79
Total coinage	2, 971, 505, 543	2, 440, 943, 473. 94

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[1] Silver-dollar coinage under act of—

April 2, 1792		$8, 031, 238
February 28, 1878	$378, 166, 793	
July 14, 1890	39, 181, 484	
March 31, 1891	5, 078, 472	
		422, 426, 749
Total		430, 457, 987

COINAGE OF FRACTIONAL AND SUBSIDIARY SILVER COINS, BY ACTS AND DENOMINATIONS, FROM 1792 TO 1894.

Denomination.	1792 to 1853.	1853 to Feb. 12, 1873.	Feb. 12, 1873, to Dec. 31, 1894.	Total silver.
Dollars	$2,506,890.00	$5,524,348.00	$422,426,749.00	$430,457,987.00
Trade dollars			35,965,924.00	35,965,924.00
Total dollars	2,506,890.00	5,524,348.00	458,392,673.00	466,423,911.00
Half dollars	66,280,640.50	32,666,832.50	30,810,525.50	129,757,998.50
Half dollars, Columbian			2,501,052.50	2,501,052.50
Quarter dollars	3,994,040.50	17,879,790.50	26,299,342.50	48,173,173.50
Quarter dollars, Columbian			10,005.75	10,005.75
Twenty-cent pieces			271,000.00	271,000.00
Dimes	3,890,230.10	4,908,520.00	19,811,421.20	28,610,171.30
Half dimes	1,825,126.40	3,055,093.00		4,880,219.40
Three-cent pieces	744,927.00	537,160.20		1,282,087.20
Total subsidiary	76,734,964.50	59,047,396.20	79,703,347.45	215,485,708.15
Total silver	79,241,854.50	64,571,744.20	538,096,020.45	681,909,619.15

Fractional silver coinage, 1792 to 1853	$76,734,964.50
Subsidiary silver coinage, 1853 to February 12, 1873	59,047,396.20
Subsidiary silver coinage, February 12, 1873, to December 31, 1894	79,703,347.45
Total	215,485,708.15

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES

[Coinage of the mint at Philadelphia from

Calendar year.	GOLD COINAGE.					
	Double eagles.	Eagles.	Half eagles.	Three dollars.	Quarter eagles.	Dollars.
1793 to 1795		$27,950	$43,535			
1796		60,800	16,995		$165.00	
1797		91,770	32,030		4,390.00	
1798		79,740	124,335		1,535.00	
1799		174,830	37,255		1,200.00	
1800		259,650	58,110			
1801		292,540	130,030			
1802		150.900	265,880		6,530.00	
1803		89,790	167,530		1,057.50	
1804		97,950	152,375		8,317.50	
1805			165,915		4,452.50	
1806			320,465		4,040.00	
1807			420,465		17,030.00	
1808			277,890		6,775.00	
1809			169,375			
1810			501,435			
1811			497,905			
1812			290,435			
1813			477,140			
1814			77,270			
1815			3,175			
1816						
1817						
1818			242,940			
1819			258,615			
1820			1,319,030			
1821			173,205		16,120.00	
1822			88,980			
1823			72,425			
1824			86,700		6,500.00	
1825			145,300		11,085.00	
1826			90,345		1,900.00	
1827			124,565		7,000.00	
1828			140,145			
1829			287,210		8,507.50	
1830			631,755		11,350.00	
1831			702,970		11,300.00	
1832			787,435		11,000.00	
1833			968,150		10,400.00	
1834			3,660,845		293,425.00	
1835			1,857,670		328,505.00	
1836			2,765,735		1,369,965.00	
1837			1,035,605		112,700.00	
1838		72,000	1,432,940		117.575.00	
1839		382,480	590,715		67,552.50	
1840		473,380	686,910		47,147.50	
1841		631,310	79,165			
1842		815,070	137,890		7,057.50	
1843		754,620	3,056,025		251,365.00	

NOTE.—Not susceptible of exact statement by years of actual date of coin, the registry of annual having been invariably completed within the year of the date of coin, as now required.

FROM THEIR ORGANIZATION, BY CALENDAR YEARS.

its organization, 1793, to December 31, 1894.]

SILVER COINAGE.							
Trade dollars.	Dollars.	Half dollars.	Quarter dollars.	Twenty cents.	Dimes.	Half dimes.	Three cents.
....	$204,791	$161,572.00	....	....	....	$4,320.80	....
....	72,920	....	$1,473.50	....	$2,213.50	511.50	....
....	7,776	1,959.00	63.00	....	2,526.10	2,226.35	....
....	327,536	....	....	....	2,755.00	....	....
....	423,515	....	....	....	....	....	....
....	220,920	....	....	....	2,176.00	1,200.00	....
....	54,454	15,144.50	....	....	3,464.00	1,695.50	....
....	41,650	14,945.00	....	....	1,097.50	650.50	....
....	66,064	15,857.50	....	....	3,304.00	1,892.50	....
....	19,570	78,259.50	1,684.50	....	826.50	....	....
....	321	105,861.00	30,348.50	....	12,078.00	780.00	....
....	....	419,788.00	51,531.00	....	....	....	....
....	....	525,788.00	55,160.75	....	16,500.00	....	....
....	....	684,300.00	....	....	....	....	....
....	....	702,905.00	....	....	4,471.00	....	....
....	....	638,138.00	....	....	635.50	....	....
....	....	601,822.00	....	....	6,518.00	....	....
....	....	814,029.50	....	....	....	....	....
....	....	620,951.50	....	....	....	....	....
....	....	519,537.50	....	....	42,150.00	....	....
....	....	....	17,308.00	....	....	....	....
....	....	23,575.00	5,000.75	....	....	....	....
....	....	607,783.50	....	....	....	....	....
....	....	980,161.00	90,293.50	....	....	....	....
....	....	1,104,000.00	36,000.00	....	....	....	....
....	....	375,561.00	31,861.00	....	94,258.70	....	....
....	....	652,898.50	54,212.75	....	118,651.20	....	....
....	....	779,786.50	16,020.00	....	10,000.00	....	....
....	....	847,100.00	4,450.00	....	44,000.00	....	....
....	....	1,752,477.00	....	....	....	....	....
....	....	1,471,583.00	42,000.00	....	51,000.00	....	....
....	....	2,002,090.00	....	....	....	....	....
....	....	2,746,700.00	1,000.00	....	121,500.00	....	....
....	....	1,537,600.00	25,500.00	....	12,500.00	....	....
....	....	1,856,078.00	....	....	77,000.00	61,500.00	....
....	....	2,382,400.00	....	....	51,000.00	62,000.00	....
....	....	2,936,830.00	99,500.00	....	77,135.00	62,135.00	....
....	....	2,398,500.00	80,000.00	....	52,250.00	48,250.00	....
....	....	2,603,000.00	39,000.00	....	48,500.00	68,500.00	....
....	....	3,206,002.00	71,500.00	....	63,500.00	74,000.00	....
....	....	2,676,003.00	488,000.00	....	141,000.00	138,000.00	....
....	1,000	3,273,100.00	118,000.00	....	119,000.00	95,000.00	....
....	....	1,814,910.00	63,100.00	....	104,200.00	113,800.00	....
....	....	1,773,000.00	208,000.00	....	199,250.00	112,750.00	....
....	300	1,667,280.00	122,786.50	....	105,311.50	53,457.50	....
....	61,005	717,504.00	47,031.75	....	135,858.00	67,204.25	....
....	173,000	155,000.00	30,000.00	....	162,250.00	57,500.00	....
....	184,618	1,006,382.00	22,000.00	....	188,750.00	40,750.00	....
....	165,100	1,922,000.00	161,400.00	....	137,000.00	58,250.00	....

coinage being of coin delivered by coiners of mints within the given year, and these deliveries not

XXXI.—Coinage of the Mints of the United States

[Coinage of the mint at Philadelphia from

Calendar year.	GOLD COINAGE.					
	Double eagles.	Eagles.	Half eagles.	Three dollars.	Quarter eagles.	Dollars.
1844	....	$63,610	$1,701,650	....	$16,960.00	....
1845	....	261,530	2,085,495	....	227,627.50	....
1846	....	200,950	1,979,710	....	53,995.00	....
1847	....	8,622,580	4,579,905	....	74,535.00	....
1848	....	1,454,840	1,303,875	....	22,215.00	....
1849	....	6,536,180	665,350	....	58,235.00	$688,567
1850	$23,405,220	2,914,510	322,455	....	632,307.50	481,953
1851	41,743,100	1,763,280	1,887,525	....	3,431,870.00	3,317,671
1852	41,060,520	2,531,060	2,869,505	....	2,899,202.50	2,045,351
1853	25,226,520	2,012,530	1,528,850	....	3,511,670.00	4,076,051
1854	15,157,980	542,500	803,375	$415,854	1,490,645.00	1,639,445
1855	7,293,320	1,217,010	585,490	151,665	588,700.00	758,269
1856	6,597,560	604,900	989,950	78,030	960,600.00	1,762,936
1857	8,787,500	166,060	490,940	62,673	535,325.00	774,789
1858	4,234,280	25,210	75,680	6,399	118,442.50	117,995
1859	871,940	160,930	84,070	46,914	98,610.00	168,244
1860	11,553,400	117,830	99,125	21,465	56,687.50	36,668
1861	59,529,060	1,132,330	3,199,750	18,216	3,181,295.00	527,499
1862	1,842,660	109,950	22,325	17,355	280,882.50	1,326,865
1863	2,855,800	12,480	12,360	15,117	75.00	6,250
1864	4,085,700	35,800	21,100	8,040	7,185.00	5,950
1865	7,024,000	40,050	6,475	3,495	3,862.50	3,725
1866	13,975,500	37,800	33,600	12,090	7,775.00	7,180
1867	5,021,300	31,400	34,600	7,950	8,125.00	5,250
1868	1,972,000	106,550	28,625	14.625	9,062.50	10,525
1869	3,503,100	18,550	8,925	7,575	10,862.50	5.925
1870	3,103,700	25,350	20,175	10,605	11,387.50	6,335
1871	1,603,000	17,800	16,150	3,990	13,375.00	3,930
1872	5,037,600	16,500	[illegible],450	6,090	7,575.00	3.530
1873	34,196,500	8,250	562,525	75	445,062.50	125,125
1874	7,336,000	531,600	17,540	125,460	9,850.00	198,820
1875	5,914,800	1,200	1,100	60	1,050.00	420
1876	11,678,100	7,320	7,385	135	10,552.50	3,245
1877	7,953,400	8,170	5,760	4,464	4,130.00	3,920
1878	10,872,900	738,000	658,700	246,972	715,650.00	3,020
1879	4,152,600	3,847,700	1,509,750	9,090	222,475.00	3,030
1880	1,029,120	16,448,760	15,832,180	3,108	7,490.00	1,636
1881	45,200	38,772,600	28,544,000	1,650	1,700.00	7,660
1882	12,600	23,244,800	12,572,800	4,620	10,100.00	5,040
1883	800	2,087,400	1,167,200	2,820	4,900.00	10,840
1884	1,420	769,050	955,240	3,318	4,982.50	6,206
1885	16,560	2,535,270	3,007,530	2,730	2,217.50	12,205
1886	22,120	2,361,600	1,942,160	3,426	10,220.00	6,016
1887	2,420	536,800	435	18,480	15,705.00	8,543
1888	4,525,820	1,329,960	91,480	15,873	40,245.00	16.080
1889	882,220	44,850	37,825	7,287	44,120.00	30,729
1890	1,510,900	580,430	21,640	....	22,032.50	....
1891	28,840	918,680	307,065	....	27,600.00	....
1892	90,460	7,975,520	3,767,860	....	6,362.50	....
1893	6,880,780	18,408,950	7,640,985	....	75,265.00	....
1894	27.879,800	24.707,780	4.789.775	....	10,305.00	....
Total	420,032,620	181,199,540	134,559,235	1,357,716	22,757,052.50	18,223,438

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[1] Includes Columbian souvenir half dollars, 1892, $475,000.

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

its organization, 1793, to December 31, 1894.]

SILVER COINAGE.							
Trade dollars.	Dollars.	Half dollars.	Quarter dollars.	Twenty cents.	Dimes.	Half dimes.	Three cents.
....	$20,000	$883,000.00	$105,300.00	....	$7,250.00	$21,500.00	....
....	24,500	294,500.00	230,500.00	....	175,500.00	78.200.00	....
....	110,660	1,105,000.00	127,500.00	....	3,130.00	1,350.00	....
....	140,750	578,000.00	183,500.00	....	24,500.00	63,700.00	....
....	15,000	290,000.00	36,500.00	....	45,150.00	33,400.00	....
....	62,600	626,000.00	85,000.00	....	83,900.00	65,450.00	....
....	7,500	113,500.00	47,700.00	....	193,150.00	47,750.00	....
....	1,300	100,375.00	40,000.00	....	102,650.00	39,050.00	$163,422.00
....	1.100	38,565.00	44,265.00	....	153,550.00	50,025.00	559,905.00
....	46.110	1,766,354.00	3,813,555.00	....	1,217,301.00	667,251.00	342,000.00
....	33,140	1,491,000.00	3,095,000.00	....	447,000.00	287,000.00	20,130.00
....	26,000	379,750.00	714,250.00	....	207,500.00	87,500.00	4,170.00
....	63,500	469,000.00	1,816,000.00	....	578,000.00	244,000.00	43,740.00
....	94,000	994,000.00	2,411,000.00	....	558,000.00	364,000.00	31,260.00
....	....	2,113,000.06	1,842,000.00	....	154,000.00	175,000.00	48,120.00
....	256.500	374,000.00	336.000.00	....	43,000.00	17,000.00	10,950.00
....	218.930	151,850.00	201,350.00	....	60,700.00	39,950.00	8,610.00
....	78,500	1,444,200.00	1.213,650.00	....	192,400.00	164,050.00	14,940.00
....	12,090	126,175.00	233,137.50	....	84,755.00	74,627.50	10,906.50
....	27,660	251,830.00	48,015.00	....	1,446.00	923.00	643.80
....	31,170	189.785.00	23,517.50	....	3,907.00	23.50	14.10
....	47,000	255,950.00	14,825.00	....	1,050.00	675.00	255.00
....	49,625	372,812.50	4,381.25	....	872.50	536.25	681.75
....	60,325	212,162.50	5,156.25	....	662.50	431.25	138.75
....	182,700	189,100.00	7,500.00	....	46,625.00	4,295.00	123.00
....	424,300	397,950.00	4,150.00	....	25,660.00	10,430.00	153.00
....	433,000	300,450.00	21,850.00	....	47,150.00	26,830.00	120.00
....	1,115,760	582,680.00	42,808.00	....	75,361.00	74,443.00	127.80
....	1,106,450	440,775.00	45,737.50	....	239,645.00	147,397.50	58.50
$397,500	293,600	1,308,750.00	371,075.00	....	394,710.00	35,630.00	18.00
987,800	....	1,180.150.00	117,975.00	....	294,070.00	....	....
218,900	....	3,013,750.00	1,07[illegible],375.00	$7,940	1,035,070.00	....	....
456,150	....	4,209,575.00	4,454,287.50	3,180	1,146,115.00	....	....
3.039,710	....	4,152,255.00	2,727,927.50	102	731,051.00	....	....
900	10,509,550	689,200.00	565,200.00	120	167,880.00	....	....
1,541	14,807,100	2,950.00	3,675.00	....	1,510.00	....	....
1,987	12,601,355	4,877.50	3,738.75	....	3,735.50	....	....
960	9.163,975	5,487.50	3,243.75	....	2,497.50	....	....
1,097	11,101,100	2,750.00	4,075.00	....	391,110.00	....	....
979	12.291,039	4.519.50	3,859.75	....	767,571.20	....	....
....	14,070,875	2,637.50	2,218.75	....	336,638.00	....	....
....	17,787,767	3,065.00	3,632.50	....	253,342.70	....	....
....	19.963,886	2,943.00	1,471.50	....	637,757.00	....	....
....	20,290,710	2,855.00	2,677.50	....	1,128,393.90	....	....
....	19,183,833	6,416.50	2,708.25	....	549,648.70	....	....
....	21,726,811	6,355.50	3,177.75	....	738,071.10	....	....
....	16,802,590	6,295.00	20,147.50	....	991,154.10	....	....
....	8,694,206	100,300.00	980,150.00	....	1,531,060.00	....	....
....	1,037,245	[1]942,622.50	2,059,311.25	....	1,212,124.50	....	....
....	378,792	[2]2,939,418.50	[3]1,371,203.75	....	334,079.20	....	....
....	110,972	574,486.00	858,243.00	....	133,097.20	....	....
5,107,524	217,530,056	86,883,615.50	33,441,747.50	11,342	19,769,131.10	3,948,791.90	1,260,487.20

[2] Includes Columbian souvenir half dollars, 1893, $2.026,052.50.

[3] Includes Columbian souvenir quarter dollars, 1893, $10,005.75.

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES

[Coinage of the mint at Philadelphia from

Calendar year.	MINOR COINAGE.		
	Five cents.	Three cents.	Two cents.
1793–1795			
1796			
1797			
1798			
1799			
1800			
1801			
1802			
1803			
1804			
1805			
1806			
1807			
1808			
1809			
1810			
1811			
1812			
1813			
1814			
1815			
1816			
1817			
1818			
1819			
1820			
1821			
1822			
1823			
1824			
1825			
1826			
1827			
1828			
1829			
1830			
1831			
1832			
1833			
1834			
1835			
1836			
1837			
1838			
1839			
1840			
1841			
1842			
1843			

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

its organization, 1793, to December 31, 1894.]

MINOR COINAGE.		TOTAL COINAGE.			TOTAL VALUE.
Cents.	Half cents.	Gold.	Silver.	Minor.	
$10,660.33	$712.67	$71,485.00	$370,683.80	$11,373.00	$453,541.80
9,747.00	577.40	77,960.00	77,118.50	10,324.40	165,402.90
8,975.10	535.24	128,190.00	14,550.45	9,510.34	152,250.79
9,797.00	....	205,610.00	330,291.00	9,797.00	545,698.00
9,045.85	60.83	213,285.00	423,515.00	9,106.68	645,906.68
28,221.75	1,057.65	317,760.00	224,296.00	29,279.40	571,335.40
13,628.37	....	422,570.00	74,758.00	13,628.37	510,956.37
34,351.00	71.83	423,310.00	58,343.00	34,422.83	516,075.83
24,713.53	489.50	258,377.50	87,118.00	25,203.03	370,698.53
7.568.38	5,276.56	258,642.50	100,340.50	12,844.94	371,827.94
9,411.16	4,072.32	170.367.50	149,388.50	13,483.48	333,239.48
3,480.00	1,780.00	324,505.00	471,319.00	5,260.00	801,084.00
7,272.21	2,380.00	437,495.00	597,448.75	9,652.21	1,044,595.96
11.090.00	2,000.00	284,665.00	684.300.00	13,090.00	982,055.00
2,228.67	5,772.86	169,375.00	707,376.00	8,001.53	884,752.53
14,585.00	1,075.00	501,435.00	638,773.50	15,660.00	1,155,868.50
2,180.25	315.70	497,905.00	608,340.00	2,495.95	1,108,740.95
10,755.00	....	290,435.00	814,029.50	10,755.00	1,115,219.50
4,180.00	....	477,140.00	620,951.50	4,180.00	1,102,271.50
3,578.30	....	77,270.00	561,687.50	3,578.30	642,535.80
....	....	3,175.00	17,308.00	....	20,483.00
28.209.82	....	....	28,575.75	28,209.82	56,785.57
39,484.00	....	....	607,783.50	39,484.00	647,267.50
31,670.00	....	242,940.00	1,070,454.50	31,670.00	1,345,064.50
26.710.00	....	258,615.00	1,140,000.00	26,710.00	1,425,325,00
44.075.50	....	1,319,030.00	501,680.70	44,075.50	1,864,786.20
3,890.00	....	189,325.00	825,762.45	3,890.00	1,018,977.45
20,723.39	....	88,980.00	805,806.50	20,723,39	915,509.89
....	....	72,425.00	895,550.00	....	967,975.00
12,620.00	....	93,200.00	1,752,477.00	12,620.00	1,858,297.00
14,611.00	315.00	156,385 00	1,564,583.00	14,926.00	1,735,894.00
15,174.25	1,170.00	92,245.00	2,002,090.00	16,344.25	2,110,679.25
23,577.32	....	131,565.00	2,869,200.00	23,577.32	3,024,342.32
22,606.24	3,030.00	140,145.00	1,575,600.00	25,636.24	1,741,381.24
14,145.00	2,435.00	295,717.50	1,994,578.00	16,580.00	2,306.875.50
17,115.00	....	643,105.00	2,495,400.00	17,115.00	3,155,620.00
33.592.60	11.00	714,270.00	3.175,600.00	33,603.60	3,923,473.60
23,620.00	....	798,435.00	2,579,000.00	23,620.00	3,401,055.00
27,390.00	770.00	978,550.00	2,759,000.00	28,160.00	3,765,710.00
18,551.00	600.00	3,954,270.00	3,415.002.00	19,151.00	7,388,423.00
38,784.00	705.00	2,186,175.00	3,443,003.00	39,489.00	5,668,667.00
21,110.00	1,990.00	4,135.700.00	3,606,100.00	23,100.00	7,764,900.00
55.583.00	....	1,148,305.00	2,096.010.00	55,583.00	3,299,898.00
63,702.00	....	1,622,515.00	2,293,000.00	63,702.00	3,979,217.00
31,286.61	....	1,040,747.50	1,949,135.50	31,286.61	3,021,169.61
24,627.00	....	1.207,437.50	1,028,603.00	24,627.00	2,260,667.50
15,973.67	....	710,475.00	577,750.00	15,973.67	1,304,198.67
23,833.90	....	960,017.50	1.442,500.00	23,833.90	2,426,351.40
24,283.20	....	4,062,010.00	2,443,750.00	24,283.20	6,530,043.20

XXXI.—Coinage of the Mints of the United States

[Coinage of the mint at Philadelphia from

Calendar year.	MINOR COINAGE.		
	Five cents.	Three cents.	Two cents.
1844			
1845			
1846			
1847			
1848			
1849			
1850			
1851			
1852			
1853			
1854			
1855			
1856			
1857			
1858			
1859			
1860			
1861			
1862			
1863			
1864			$396,950.00
1865		$341,460.00	272,800.00
1866	$737,125.00	144,030.00	63,540.00
1867	1,545,475.00	117,450.00	58,775.00
1868	1,440,850.00	97,560.00	56,075.00
1869	819,750.00	48,120.00	30,930.00
1870	240,300.00	40,050.00	17,225.00
1871	28,050.00	18,120.00	14,425.00
1872	301,800.00	25,860.00	1,300.00
1873	227,500.00	35,190.00	
1874	176.900.00	23,700.00	
1875	104,850.00	6,840.00	
1876	126,500.00	4,860.00	
1877			
1878	117.50	70.50	
1879	1,455.00	1,236.00	
1880	997.75	748.65	
1881	3,618.75	32,417.25	
1882	573,830.00	759.00	
1883	1,148,471.05	318.27	
1884	563,697.10	169.26	
1885	73,824.50	143.70	
1886	166,514.50	128.70	
1887	763,182.60	238.83	
1888	536,024.15	1,232.49	
1889	794,068.05	646 83	
1890	812,963.60		
1891	841,717.50		
1892	584,982.10		
1893	668,509.75		
1894	270,656.60		
Total	13,553,730.50	941,349.48	912,020.00

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

its organization, 1793, to December 31, 1894.]

MINOR COINAGE.		TOTAL COINAGE.			TOTAL VALUE.
Cents.	Half cents.	Gold.	Silver.	Minor.	
$23,987.52	....	$1,782,220.00	$1,037,050.00	$23,987.52	$2,843,257.52
38,948.04	....	2,574,652.50	803,200.00	38,948.04	3,416,800.54
41,208.00	....	2,234,655.00	1,347,580.00	41,208.00	3,623,443.00
61,836.69	....	13,277,020.00	990,450.00	61,836.69	14,329,306.69
64,157.99	....	2,780,930.00	420,050.00	64,157.99	3,265,137.99
41,785.00	$199.32	7,948,332.00	922,950.00	41,984.32	8,913,266.32
44,268.44	199.06	27,756,445.50	409,600.00	44,467.50	28,210,513.00
98,897.07	738.36	52,143,446.00	446,797.00	99,635.43	52,689,878.43
50,630.94	....	51,505,638.50	847,410.00	50,630.94	52,403,679.44
66,411.31	648.47	36,355,621.00	7,852,571.00	67,059.78	44,275,251.78
42,361.56	276.79	20,049,799.00	5,373,270.00	42,638.35	25,465,707.35
15,748.29	282.50	10,594,454.00	1,419,170.00	16,030.79	12,029,654.79
26,904.63	202.15	10,993,976.00	3,214,240.00	27,106.78	14,235,322.78
177,834.56	175.90	10,817,287.00	4,452,260.00	178,010.46	15,447,557.46
246,000.00	....	4,578,006.50	4,332,120.00	246,000.00	9,156,126.50
364.000.00	....	1,430,708.00	1,037,450.00	364,000.00	2,832,158.00
205,660.00	....	11,885,175.50	681,390.00	205,660.00	12,772,225.50
101,000.00	....	67,588,150.00	3,107,740.00	101,000.00	70,796,890.00
280,750.00	....	3,600,037.50	541,691.50	280,750.00	4,422,479.00
498,400.00	....	2,902,082.00	330,517.80	498,400.00	3,730,999.80
529,737.14	....	4,163,775.00	248,417.10	926,687.14	5,338,879.24
354,292.86	....	7,081,607.50	319,755.00	968,552.86	8,369,915.36
98,265.00	....	14,073,945.00	428,909.25	1,042,960.00	15,545,814.25
98,210.00	....	5,108,625.00	278,876.25	1,819,910.00	7,207,411.25
102,665.00	....	2,141,387.50	430,343.00	1,697,150.00	4,268,880.50
64,200.00	....	3,554,937.50	862,643.00	963,000.00	5,380,580.50
52,750.00	....	3,177,552.50	829,400.00	350,325.00	4,357,277.50
39,295.00	....	1,658,245.00	1,891,179.80	99,890.00	3,649,314.80
40,420.00	....	5,079,745.00	1,980,063.50	369,380.00	7,429,188.50
116,765.00	....	35,337,537.50	2,801,283.00	379,455.00	38,518,275.50
141,875.00	....	8,219,270.00	2,579,995.00	342,475.00	11,141,740.00
135,280.00	....	5,918,630.00	5,349,035.00	246,970.00	11,514,635.00
79,440.00	....	11,706,737.50	10,269,307.50	210,800.00	22,186,845.00
8,525.00	....	7,979,844.00	10,651,045.50	8,525.00	18,639,414.50
57,998.50	....	13,235,242.00	11,932,850.00	58,186.50	25,226,278.50
162,312.00	....	9,744,645.00	14,816,776.00	165,003.00	24,726,424.00
389,649.55	....	33,322,294.00	12,615,693.75	391,395.95	46,329,383.70
392,115.75	....	67,372,810.00	9,176,163.75	428,151.75	76,977,125.50
385,811.00	....	35,849,960.00	11,500,132.00	960,400.00	48,310,492.00
455,981.09	....	3,273,960.00	13,067,968.45	1,604,770.41	17,946,698.86
232,617.42	....	1,740,216.50	14,412,369.25	796,483.78	16,949,069.53
117,653.84	....	5,576,512.50	18,047,807.20	191,622.04	23,815,941.74
176,542.90	....	4,345,542.00	20,606,057.50	343,186.10	25,294,785.60
452,264.83	....	582,383.00	21,424,636.40	1,215,686.26	23,222,705.66
374,944.14	....	6,018,958.00	19,742,606.45	912,200.78	26,673,765.23
488,693.61	....	1,047,031.00	22,474,415.35	1,283,408.49	24,804,854.84
571,828.54	....	2,144,002.50	17,820,186.60	1,384,792.14	21,348,981.24
470,723.50	....	1,282,185.00	11,305,716.00	1,312,441.00	13,900,342,00
376,498.32	....	11,840,202.50	5,251,303.25	961,480.42	18,052,986.17
466,421.95	....	33,011,980.00	5,023,523.45	1,134,931.70	39,170,435.15
167,521.32	....	56,887,660.00	1,676,798.20	438,177.92	59,002,636.12
11,034,505.70	39,926.11	778,129,601.50	367,952,695.20	26,481,531.79	1,172,563,828.49

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES

[Coinage of the mint at New Orleans from its organization, 1838, to

Calendar year.	GOLD.						SILVER.
	Double eagles.	Eagles.	Half eagles.	Three dollars.	Quarter eagles.	Dollars.	Dollars.
1838							
1839					$44, 452. 50		
1840			$152, 000		65, 500. 00		
1841		$25, 000	41, 750		18, 450. 00		
1842		274, 000	82, 000		49, 500. 00		
1843		1, 751, 620	505, 375		920, 005. 00		
1844		1. 187, 000	1, 823, 000				
1845		475, 000	205, 000				
1846		817, 800	290, 000		165, 000. 00		$59, 000
1847		5. 715, 000	60, 000		310, 000, 00		
1848		358, 500					
1849		239, 000				$215, 000	
1850	$2, 820, 000	575, 000			210, 000. 00	14, 000	40, 000
1851	6, 300, 000	2, 630, 000	205, 000		370, 000. 00	290, 000	
1852	3, 800, 000	180, 000			350, 000. 00	140, 000	
1853	1. 420, 000	510, 000				290, 000	
1854	65, 000	525, 000	230, 000	$72, 000	382, 500. 00		
1855	160, 000	180, 000	55, 500			55, 000	
1856	45, 000	145, 000	50, 000		52, 750. 00		
1857	600, 000	55, 000	65, 000		85, 000. 00		
1858	705, 000	200, 000					
1859	182, 000	23, 000					360, 000
1860	132, 000	111, 000					515, 000
1861[1]	100, 000						
1879	46, 500	15, 000					2, 887, 000
1880		92, 000					5, 305, 000
1881		83, 500					5, 708, 000
1882		108, 200					6, 090, 000
1883		8, 000					8, 725, 000
1884							9, 730, 000
1885							9, 185, 000
1886							10, 710, 000
1887							11, 550, 000
1888		213, 350					12, 150, 000
1889							11, 875, 000
1890							10, 701, 000
1891							7, 954, 529
1892		286, 880	50, 000				2, 744, 000
1893		170, 000	550, 000				300, 000
1894		1, 075, 000	83, 000				1, 723, 000
Total	16, 375, 500	18, 028, 850	4, 447, 625	72, 000	3, 023, 157. 50	1, 004, 000	118, 311, 529

[1] No coinage from 1862 to 1878, inclusive.

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

its suspension, 1861, and from its reopening, 1879, to December 31, 1893.]

SILVER.					TOTAL COINAGE.		TOTAL VALUE.
Half dollars.	Quarter dollars.	Dimes.	Half dimes.	Three cents.	Gold.	Silver.	
		$40, 243. 40				$40, 243. 40	$40, 243. 40
$81, 488		124, 327. 20	$54, 827. 50		$44, 452. 50	260, 642. 70	305, 095. 20
427, 550	$106, 300	117, 500. 00	46, 750. 00		217, 500. 00	698, 100. 00	915, 600. 00
200, 500	113, 000	.200, 750. 00	40, 750. 00		85, 200 00	555, 000. 00	640, 200. 00
478, 500	192, 250	202, 000. 00	17, 500. 00		405, 500. 60	890, 250. 00	1, 295, 750. 00
1, 134, 000	242. 000	15, 000. 00			3, 177, 000. 00	1, 391, 000. 00	4, 568, 000. 00
1, 002, 500	185, 000		11, 000. 00		3, 010, 000. 00	1, 198, 500. 00	4, 208, 500. 00
1, 047, 000		23, 000. 00			680, 000. 00	1, 070, 000. 00	1, 750, 000. 00
1, 152, 000					1, 272, 800. 00	1, 211, 000. 00	2, 483, 800. 00
1, 292, 000	92, 000				6, 085, 000. 00	1, 384, 000. 00	7, 469, 000. 00
1, 590, 000			30, 000. 00		358, 500. 00	1, 620, 000. 00	1, 978, 500.00
1, 155, 000		30, 000. 00	7, 000. 00		454, 000. 00	1, 192, 000. 00	1, 646, 000. 00
1, 228, 000	103, 000	51, 000. 00	34, 500. 00		3, 619. 000. 00	1, 456, 500. 00	5, 075, 500. 00
201, 000	22, 000	40, 000. 00	43, 000. 00	$21, 600	9, 795, 000. 00	327, 600. 00	10. 122, 600. 00
72, 000	24, 000	43, 000. 00	13, 000. 00		4, 470, 000. 00	152, 000. 00	4, 622, 000. 00
664, 000	333, 000	110, 000. 00	118, 000. 00		2, 220, 000. 00	1, 225, 000. 00	3, 445, 000. 00
2, 620, 000	371, 000	177, 000. 00	78, 000, 00		1, 274, 500. 00	3, 246, 000. 00	4, 520, 500. 00
1, 844, 000	44, 000		30, 000. 00		450, 500. 00	1, 918, 000. 00	2, 368, 500. 00
1, 329, 000	242, 000	118, 000. 00	55, 000. 00		292, 750. 00	1, 744, 000. 00	2, 036, 750. 00
409, 000	295, 000	154, 000. 00	69, 000. 00		805, 000. 00	927, 000. 00	1, 732, 000. 00
3, 647, 000	130, 000	29, 000. 00	83, 000. 00		905, 000. 00	3, 889, 000. 00	4, 794, 000. 00
1, 417, 000	65, 000	48, 000. 00	28, 000. 00		205, 000. 00	1, 918, 000. 00	2, 123, 000. 00
645, 000	97, 000	4, 000. 00	53, 000. 00		243, 000. 00	1, 314, 000. 00	1, 557, 000. 00
165, 000					100, 000. 00	165, 000. 00	265, 000. 00
					61, 500. 00	2, 887, 000. 00	2, 948, 500. 00
					92, 000. 00	5, 305, 000. 00	5, 397, 000. 00
					83, 500. 00	5, 708, 000. 00	5, 791, 500. 00
					108, 200. 00	6 090, 000. 00	6, 198, 200. 00
					8, 000. 00	8, 725, 000. 00	8, 733, 000. 00
						9, 730, 000. 00	9, 730, 000. 00
						9, 185, 000. 00	9, 185, 000. 00
						10, 710, 000. 00	10, 710, 000. 00
						11, 550, 000. 00	11, 550, 000. 00
					213, 350. 00	12, 150, 000. 00	12, 363, 350. 00
						11, 875, 000. 00	11, 875, 000. 00
						10, 701, 000. 00	10, 701, 000. 00
	17, 000	454, 000. 00				8, 425, 529. 00	8, 425, 529. 00
195, 000	660, 000	384, 170. 00			336, 880. 00	3, 983, 170. 00	4, 320, 050. 00
694, 500	849, 000	176, 000. 00			720, 000. 00	2, 019, 500. 00	2, 739, 500. 00
1, 069, 000	713, 000	72, 000. 00			1, 158, 000. 00	3, 577, 000. 00	4, 735, 000. 00
25, 860, 038	4, 895, 550	2, 612, 990. 60	812, 327. 50	21, 600	42, 951, 132. 50	152,414,035.10	195, 365, 167. 60

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

[Coinage of the mint at Charlotte, N. C., from its organization, 1838, to its suspension, 1861.]

Calendar year.	GOLD.			TOTAL VALUE.
	Half eagles.	Quarter eagles.	Dollars.	
1838	$64, 565	$19, 770. 00	....	$84, 335. 00
1839	117, 335	45, 432. 50	....	162, 767. 50
1840	95, 140	32, 095. 00	....	127, 235. 00
1841	107, 555	25, 742. 50	....	133, 297. 50
1842	137, 400	16, 842. 50	....	154, 242. 50
1843	221, 765	65, 240. 00	....	287, 005. 00
1844[1]	118, 155	29, 055. 00	....	147, 210. 00
1845	....	....	....	....
1846	64, 975	12, 020. 00	....	76, 995. 00
1847	420, 755	58, 065. 00	....	478, 820. 00
1848	322, 360	41, 970. 00	....	364, 330. 00
1849	324, 115	25, 550. 00	$11, 634	361, 299. 00
1850	317, 955	22, 870. 00	6, 966	347, 791. 00
1851	245, 880	37, 307. 50	41, 267	324, 454. 50
1852	362, 870	24, 430. 00	9, 434	396, 734. 00
1853	327, 855	....	11, 515	339, 370. 00
1854	196, 455	18, 237. 50	4	214, 696. 50
1855	198, 940	9, 192. 50	9, 803	217, 935. 50
1856	142, 285	19, 782. 50	....	162, 067. 50
1857	156, 800	....	13, 280	170, 080. 00
1858	194, 280	22, 640. 00	....	216, 920. 00
1859	159, 235	....	5, 235	164, 470. 00
1860	74, 065	18, 672. 50	....	92, 737. 50
1861	34, 395	....	....	34, 395. 00
Total	4, 405, 135	544, 915. 00	109, 138	5, 059, 188. 00

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[1] Mint burned July 27, 1844.

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES FROM THEIR ORGANIZATION BY CALENDAR YEARS—Continued.

[Coinage of the mint at Dahlonega, Ga., from its organization, 1838, to its suspension, 1861.]

Calendar year.	GOLD.				TOTAL VALUE.
	Half eagles.	Three dollars.	Quarter eagles.	Dollars.	
1838	$102,915				$102,915.00
1839	94,695		$34,185.00		128,880.00
1840	114,480		8,830.00		123,310.00
1841	152,475		10,410.00		162,885.00
1842	298,040		11,607.50		309,647.50
1843	492,260		90,522.50		582,782.50
1844	444,910		43,330.00		488,240.00
1845	453,145		48,650.00		501,795.00
1846	401,470		48,257.50		449,727.50
1847	322,025		39,460.00		361,485.00
1848	237,325		34,427.50		271,752.50
1849	195,180		27,362.50	$21,588	244,130.50
1850	219,750		30,370.00	8,382	258,502.00
1851	313,550		28,160.00	9,882	351,592.00
1852	457,260		10,195.00	6,360	473,815.00
1853	448,390		7,945.00	6,583	462,918.00
1854	282,065	$3,360	4,400.00	2,935	292,760.00
1855	112,160		2,807.50	1,811	116,778.50
1856	98,930		2,185.00	1,460	102,575.00
1857	85,230		5,910.00	3,533	94,673.00
1858	76,810			3,477	80,287.00
1859	51,830		5,610.00	4,952	62,392.00
1860	73,175			1,566	74,741.00
1861	7,985				7,985.00
Total	5,536,055	3,360	494,625.00	72,529	6,106,569.00

XXXI.—Coinage of the Mints of the United States

[Coinage of the mint at San Francisco

Calendar year.	GOLD.						SILVER.	
	Double eagles.	Eagles.	Half eagles.	Three dollars.	Quarter eagles.	Dollars.	Dollars.	Trade dollars.
1854	$2, 829, 360	$1, 238, 260	$1, 340	....	$615	$14, 632	....	....
1855	17, 593, 500	90, 000	305, 000	$19, 800	....	....	....	....
1856	23, 795, 000	680, 000	525, 500	103, 500	177, 800	24, 600	....	....
1857	19, 410, 000	260, 000	435, 000	42, 000	170, 000	10, 000	....	....
1858	16, 934, 200	118, 000	93, 000	....	3, 000	10, 000	....	....
1859	12, 728, 900	70, 000	66, 100	....	38, 000	15, 000	$20, 000	....
1860	10, 899, 000	50, 000	106, 000	21, 000	89, 000	13, 000	....	....
1861	15, 360, 000	155, 000	90, 000	....	60, 000	....	....	....
1862	17, 083, 460	125, 000	47, 500	....	20, 000	....	....	....
1863	19, 331, 400	100, 000	85, 000	....	27, 000	....	....	....
1864	15, 873, 200	25, 000	19, 440	....	....	....	....	....
1865	20, 850, 000	167, 000	138, 060	....	58, 440	....	....	....
1866	16, 845, 000	200, 000	219, 600	....	97, 400	....	....	....
1867	18, 415, 000	90, 000	145, 000	....	70, 000	....	....	....
1868	16, 750, 000	135, 000	260, 000	....	85, 000	....	....	....
1869	13, 735, 000	64, 300	155, 000	....	73, 750	....	....	....
1870	19, 640, 000	80, 000	85, 000	....	40, 000	3, 000	....	....
1871	18, 560, 000	165, 000	125, 000	....	55, 000	....	....	....
1872	15, 600, 000	173, 000	182, 000	....	45, 000	....	9, 000	....
1873	20, 812, 000	120, 000	155, 000	....	67, 500	....	700	$703, 000
1874	24, 280, 000	100, 000	80, 000	....	....	....	....	2, 549, 000
1875	24, 600, 000	....	45, 000	....	29, 000	....	....	4, 487, 000
1876	31, 940, 000	50, 000	20, 000	....	12, 500	....	....	5, 227, 000
1877	34, 700, 000	170, 000	133, 500	....	88, 500	....	....	9, 519, 000
1878	34, 780, 000	261, 000	723, 500	....	445, 000	....	9, 774, 000	4, 162, 000
1879	24, 476, 000	2, 240, 000	2, 131, 000	....	108, 750	....	9, 110, 000	....
1880	16, 720, 000	5, 062, 500	6, 744, 500	....	....	....	8, 900, 000	....
1881	14, 540, 000	9, 700, 000	4, 845, 000	....	....	....	12, 760, 000	....
1882	22, 500, 000	1, 320, 000	4, 845, 000	....	....	....	9, 250, 000	....
1883	23, 780, 000	380, 000	416, 000	....	....	....	6, 250, 000	....
1884	18, 320, 000	1, 242, 500	885, 000	....	....	....	3, 200, 000	....
1885	13, 670, 000	2, 280, 000	6, 057, 500	....	....	....	1, 497, 000	....
1886	....	8, 260, 000	16, 340, 000	....	....	....	750, 000	....
1887	5, 660, 000	8, 170, 000	9, 560, 000	....	....	....	1, 771, 000	....
1888	17, 192, 000	6, 487, 000	1, 469, 500	....	....	....	657, 000	....
1889	15, 494, 000	4, 254, 000	....	....	....	....	700, 000	....
1890	16, 055, 000	....	....	....	....	....	8, 230, 373	....
1891	25, 762, 500	....	....	....	....	....	5, 296, 000	....
1892	18, 603, 000	1, 155, 000	1, 492, 000	....	....	....	1, 200, 000	....
1893	19, 923, 500	1, 413, 500	1, 120, 000	....	....	....	100, 000	....
1894	20, 971, 000	250, 000	279, 500	....	....	....	1, 260, 000	....
Total	757, 012, 020	56, 901, 060	60, 425, 540	186, 300	1, 861, 255	90, 232	80, 735, 073	26, 647, 000

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

from its organization, 1854, to December 31, 1894.]

SILVER.					TOTAL COINAGE.		TOTAL VALUE.
Half dollars.	Quarter dollars.	Twenty cents.	Dimes.	Half dimes.	Gold.	Silver.	
....	....	....	....	....	$4,084,207	....	$4,084,207.00
$64,975	$99,100.00	....	....	....	18,008,300	$164,075.00	18,172,375.00
105,500	71,500.00	....	$7,000.00	....	25,306,400	184,000.00	25,490,400.00
79,000	20,500.00	....	....	....	20,327,000	99,500.00	20,426,500.00
238,000	30,250.00	....	6,000.00	....	17,158,200	274,250.00	17,432,450.00
283,000	20,000.00	....	6,000.00	....	12,918,000	329,000.00	13,247,000.00
236,000	14,000.00	....	14,000.00	....	11,178,000	264,000.00	11,442,000.00
469,750	24,000.00	....	17,250.00	....	15,665,000	511,000.00	16,176,000.00
676,000	16,750.00	....	18,075.00	....	17,275,960	710,825.00	17,986,785.00
458,000	....	....	15,750.00	$5,000	19,543,400	478,750.00	20,022,150.00
329,000	5,000.00	....	23,000.00	4,500	15,917,640	361,500.00	16,279,140.00
337,500	10,250.00	....	17,500.00	6,000	21,213,500	371,250.00	21,584,750.00
527,000	7,000.00	....	13,500.00	6,000	17,362,000	553,500.00	17,915,500.00
598,000	12,000.00	....	14,000.00	6,000	18,720,000	630,000.00	19,350,000.00
580,000	24,000.00	....	26,000.00	14,000	17,230,000	644,000.00	17,874,000.00
328,000	19,000.00	....	45,000.00	11,500	14,028,050	403,500.00	14,431,550.00
502,000	....	....	5,000.00	....	19,848,000	507,000.00	20,355,000.00
1,089,000	7,725.00	....	32,000.00	8,050	18,905,000	1,136,775.00	20,041,775.00
290,000	20,750.00	....	19,000.00	41,850	16,000,000	380,600.00	16,380,600.00
116,500	39,000.00	....	45,500.00	16,200	21,154,500	920,900.00	22,075,400.00
197,000	98,000.00	....	24,000.00	....	24,460,000	2,868,000.00	27,328,000.00
1,600,000	170,000.00	$231,000	907,000.00	....	24,674,000	7,395,000.00	32,069,000.00
2,264,000	2,149,000.00	....	1,042,000.00	....	32,022,500	10,682,000.00	42,704,500.00
2,678,000	2,249,000.00	....	234,000.00	....	35,092,000	14,680,000.00	49,772,000.00
6,000	35,000.00	....	....	....	36,209,500	13,977,000.00	50,186,500.00
....	....	....	....	....	28,955,750	9,110,000.00	38,065,750.00
....	....	....	....	....	28,527,000	8,900,000.00	37,427,000.00
....	....	....	....	....	29,085,000	12,760,000.00	41,845,000.00
....	....	....	....	....	28,665,000	9,250,000.00	37,915,000.00
....	....	....	....	....	24,576,000	6,250,000.00	30,826,000.00
....	....	....	56,496.90	....	20,447,500	3,256,496.90	23,703,996.90
....	....	....	4,369.00	....	22,007,500	1,501,369.00	23,508,869.00
....	....	....	20,652.40	....	24,600,000	770,652.40	25,370,652.40
....	....	....	445,445.00	....	23,390,000	2,216.445.00	25,606,445.00
....	304,000.00	....	172,000.00	....	25,148,500	1,133,000.00	26,281,500.00
....	....	....	97,267.80	....	19,748,000	797,267.80	20,545,267.80
....	....	....	142,307.60	....	16,055,000	8,372,680.60	24,427,680.60
....	554,000.00	....	319,611.60	....	25,762,500	6.169,611.60	31,932,111.60
514,514	241,019.75	....	99,071.00	....	21,250,000	2,054,604.75	23,304,604.75
370,000	363,633.75	....	249,140.00	....	22,457,000	1,082,773.85	23,539,773.85
2,024,345	662,205.25	....	2.40	....	21,500,500	3,946,552.65	25,447,052.65
16,961,084	7,266,683.75	231,000	4,137,938.70	119,100	876,476,407	136,097,879.55	1,012,574,286.55

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES

[Coinage of the mint at Carson City

Calendar year.	GOLD.			SILVER.	
	Double eagles.	Eagles.	Half eagles.	Dollars.	Trade dollars.
1870	$75,780	$59,080	$38,375	$12,462	....
1871	293,740	71,850	103,850	1,376	....
1872	593,000	55,000	84,900	3,150	....
1873	448,200	45,430	37,080	2,300	$124,500
1874	2,301,700	167,670	105,990	....	1,373,200
1875	2,223,020	77,150	59,140	....	1,573,700
1876	2,768,820	46,960	34,435	....	509,000
1877	851,300	33,320	43,400	....	534,000
1878	263,600	32,440	45,270	2,212,000	97,000
1879	214,160	17,620	86,405	756,000	....
1880	....	111,900	255,085	591,000	....
1881	....	240,150	69,430	296,000	....
1882	782,800	67,640	414,085	1,133,000	....
1883	1,199,240	120,000	64,790	1,204,000	....
1884	1,622,780	99,250	82,010	1,136,000	....
1885	189,000	....	....	228,000	....
1886[1]	....	....	....	....	....
1887[1]	....	....	....	....	....
1888[1]	....	....	....	....	....
1889[2]	618,900	....	....	350,000	....
1890	1,824,180	175,000	269,000	2,309,041	....
1891	100,000	1,037,320	1,040,000	1,618,000	....
1892	515,300	400,000	414,840	1,352,000	....
1893[3]	368,040	140,000	300,000	677,000	....
Total	17,283,560	2,997,780	3,548,085	13,881,329	4,211,400

[1] Coinage suspended.

[2] Operations resumed October 1, 1889.

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

from its organization, 1870, to December 31, 1893.]

SILVER.				TOTAL COINAGE.		TOTAL VALUE.
Half dollars.	Quarter dollars.	Twenty cents.	Dimes.	Gold.	Silver.	
$27,308.50	$2,085.00	....	....	$173,235	$41,855.50	$215,090.50
69,975.00	2 722.50	....	$2,010.00	469,440	76,083.50	545,523.50
136,000.00	2.275.00	....	2,400.00	732,900	143,825.00	876.725.00
168,530.00	4 115.50	....	3,119.10	530,710	302,564.60	833,274.60
29,500.00	....	....	1,081.70	2,575,360	1,403,781.70	3,979,141.70
504,000.00	35,000.00	$26,658	464,500.00	2,359,310	2.603,858.00	4,963,168.00
978,000.00	1,236,000.00	2,000	827,000.00	2,850,215	3,552,000.00	6,402,215.00
710,000.00	1,048,000.00	....	770,000.00	928,020	3,062,000.00	3,990,020.00
31,000.00	249,000.00	....	20,000.00	341,310	2,609,000.00	2,950,310.00
....	....	....	....	318,185	756,000.00	1,074,185.00
....	....	....	....	366,985	591,000.00	957,985.00
....	....	....	....	309,580	296,000.00	605,580.00
....	....	....	....	1,264,525	1,133,000.00	2.397,525 00
....	....	....	....	1,384,030	1,204,000.00	2,588,030.00
....	....	....	....	1,804,040	1,136,000.00	2,940,040.00
....	....	....	....	189,000	228,000.00	417,000.00
....	....	....	....	....	....	....
....	....	....	....	....	....	....
....	....	....	....	....	....	....
....	....	....	....	618,900	350,000.00	968,900.00
....	....	....	....	2,268,180	2,309,041.00	4,577,221.00
....	....	....	....	2,177,320	1,618,000.00	3,795,320.00
....	....	....	....	1,360,140	1,352,000.00	2,712,140.00
....	....	....	....	808,040	677,000.00	1,485.040.00
2,654,313.50	2,579,198.00	28,658	2,090,110.80	23,829,425	25,445,009.30	49,274,434.30

[3] Coinage suspended from May 23, 1893.

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES

RECAPITULATION.

Calendar year.	GOLD COINAGE.					
	Double eagles.	Eagles.	Half eagles.	Three dollars.	Quarter eagles.	Dollars.
1793–1795		$27,950	$43,535			
1796		60,800	16,995		$165 00	
1797		91,770	32,030		4,390.00	
1798		79,740	124,335		1,535.00	
1799		174,830	37,255		1,200.00	
1800		259,650	58,110			
1801		292,540	130,030			
1802		150,900	265,880		6,530.00	
1803		89,790	167,530		1,057.50	
1804		97,950	152,375		8,317.50	
1805			165,915		4,452.50	
1806			320,465		4,040.00	
1807			420,465		17,030.00	
1808			277,890		6,775.00	
1809			169,375			
1810			501,435			
1811			497,905			
1812			290,435			
1813			477,140			
1814			77,270			
1815			3,175			
1816						
1817						
1818			242,940			
1819			258,615			
1820			1,319,030			
1821			173,205		16,120.00	
1822			88,980			
1823			72,425			
1824			86,700		6,500.00	
1825			145,300		11,085.00	
1826			90,345		1,900.00	
1827			124,565		7,000.00	
1828			140,145			
1829			287,210		8,507.50	
1830			631,755		11,350.00	
1831			702,970		11,300.00	
1832			787,435		11,000.00	
1833			968,150		10,400.00	
1834			3,660,845		293,425.00	
1835			1,857,670		328,505.90	
1836			2,765,735		1,369,965.00	
1837			1,035,605		112,700.00	
1838		72,000	1,600.420		137,345.00	
1839		382,480	802,745		191,622.50	
1840		473,380	1,048,530		153,572.50	
1841		656,310	380,945		54,602.50	
1842		1,089,070	655,330		85,007.50	
1843		2,506,240	4,275,425		1,327,132.50	
1844		1,250,610	4,087,715		89,345.00	
1845		736,530	2,743,640		276,277.50	

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

RECAPITULATION.

SILVER COINAGE.							
Trade dollars.	Dollars.	Half dollars.	Quarter dollars.	Twenty cents.	Dimes.	Half dimes.	Three cents.
....	$204,791	$161,572.00	....	....	....	$4,320.80	....
....	72,920	....	$1,473.50	....	$2,213.50	511.50	....
....	7,776	1,959.00	63.00	....	2,526.10	2,226.35	....
....	327,536	....	....	....	2,755.00	....	....
....	423,515	....	....	....	....	....	....
....	220,920	....	....	....	2,176.00	1,200.00	....
....	54,454	15,144.50	....	....	3,464.00	1,695.50	....
....	41,650	14,945.00	....	....	1,097.50	650.50	....
....	66,064	15,857.50	....	....	3,304.00	1,892.50	....
....	19,570	78,259.50	1,684.50	....	826.50	....	....
....	321	105,861.00	30,348.50	....	12,078.00	780.00	....
....	....	419,788.00	51,531.00	....	....	....	....
....	....	525,788.00	55,160.75	....	16,500.00	....	....
....	....	684,300.00	....	....	....	....	....
....	....	702,905.00	....	....	4,471.00	....	....
....	....	638,138.00	....	....	635.50	....	....
....	....	601,822.00	....	....	6,518.00	....	....
....	....	814,029.50	....	....	....	....	....
....	....	620,951.50	....	....	....	....	....
....	....	519,537.50	....	....	42,150.00	....	....
....	....	....	17,308.00	....	....	....	....
....	....	23,575.00	5,000.75	....	....	....	....
....	....	607,783.50	....	....	....	....	....
....	....	980,161.00	90,293.50	....	....	....	....
....	....	1,104,000.00	36,000.00	....	....	....	....
....	....	375,561.00	31,861.00	....	94,258.70	....	....
....	....	652,898.50	54,212.75	....	118,651.20	....	....
....	....	779,786.50	16,020.00	....	10,000.00	....	....
....	....	847,100.00	4,450.00	....	44,000.00	....	....
....	....	1,752,477.00	....	....	....	....	....
....	....	1,471,583.00	42,000.00	....	51,000.00	....	....
....	....	2,002,090.00	....	....	....	....	....
....	....	2,746,700.00	1,000.00	....	121,500.00	....	....
....	....	1,537,600.00	25,500.00	....	12,500.00	....	....
....	....	1,856,078.00	....	....	77,000.00	61,500.00	....
....	....	2,382,400.00	....	....	51,000.00	62,000.00	....
....	....	2,936,830.00	99,500.00	....	77,135.00	62,135.00	....
....	....	2,398,500.00	80,000.00	....	52,250.00	48,250.00	....
....	....	2,603,000.00	39,000.00	....	48,500.00	68,500.00	....
....	....	3,206,002.00	71,500.00	....	63,500.00	74,000.00	....
....	....	2,676,003.00	488,000.00	....	141,000.00	138,000.00	....
....	1,000	3,273,100.00	118,000.00	....	119,000.00	95,000.00	....
....	....	1,814,910.00	63,100.00	....	104,200.00	113,800.00	....
....	....	1,773,000.00	208,000.00	....	239,493.40	112,750.00	....
....	300	1,748,768.00	122,786.50	....	229,638.70	108,285.00	....
....	61,005	1,145,054.00	153,331.75	....	253,358.00	113,954.25	....
....	173,000	355,500.00	143,000.00	....	363,000.00	98,250.00	....
....	184,618	1,484,882.00	214,250.00	....	390,750.00	58,250.00	....
....	165,100	3,056,000.00	403,400.00	....	152,000.00	58,250.00	....
....	20,000	1,885,500.00	290,300.00	....	7,250.00	32,500.00	....
....	24,500	1,341,500.00	230,500.00	....	198,500.00	78,200.00	....

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES

RECAPITULATION—Continued.

Calendar year.	GOLD COINAGE.					
	Double eagles.	Eagles.	Half eagles.	Three dollars.	Quarter eagles.	Dollars.
1846	....	$1, 018, 750	$2, 736, 155	....	$279, 272. 50	....
1847	....	14, 337, 580	5, 382, 685	....	482, 060. 00	....
1848	....	1, 813, 340	1, 863, 560	....	98, 612. 50	....
1849	....	6, 775, 180	1, 184, 645	....	111, 147. 50	$936, 789
1850	$26, 225, 220	3, 489, 510	860, 160	....	895, 547. 50	511, 301
1851	48, 043, 100	4, 393, 280	2, 651, 955	....	3, 867, 337. 50	3, 658, 820
1852	44, 860, 520	2, 811, 060	3, 689, 635	....	3, 283, 827. 50	2, 201, 145
1853	26, 646, 520	2, 522, 530	2, 305, 095	....	3, 519, 615. 00	4, 384, 149
1854	18, 052, 340	2, 305, 760	1, 513, 235	$491, 214	1, 896, 397. 50	1, 657, 016
1855	25, 046, 820	1, 487, 010	1, 257, 090	171, 465	600, 700. 00	824, 883
1856	30, 437, 560	1, 429, 900	1, 806, 665	181, 530	1, 213, 117. 50	1, 788, 996
1857	28, 797, 500	481, 060	1, 232, 970	104, 673	796, 235. 00	801, 602
1858	21, 873, 480	343, 210	439, 770	6, 399	144, 082. 50	131, 472
1859	13, 782, 840	253, 930	361, 235	46, 914	142, 220. 00	193, 431
1860	22, 584, 400	278, 830	352, 365	42, 465	164, 360. 00	51, 234
1861	74, 989, 060	1, 287, 330	3, 332, 130	18, 216	3, 241, 295. 00	527, 499
1862	18, 926, 120	234, 950	69, 825	17, 355	300, 882. 50	1, 326, 865
1863	22, 187, 200	112, 480	97, 360	15, 117	27, 075. 00	6, 250
1864	19, 958, 900	60, 800	40, 540	8, 040	7, 185. 00	5, 950
1865	27, 874, 000	207, 050	144, 535	3, 495	62, 302. 50	3, 725
1866	30, 820, 500	237, 800	253, 200	12, 090	105, 175. 00	7, 180
1867	23, 436, 300	121, 400	179, 600	7, 950	78, 125. 00	5, 250
1868	18, 722, 000	241, 550	288, 625	14, 625	94, 062. 50	10, 525
1869	17, 238, 100	82, 850	163, 925	7, 575	84, 612. 50	5, 925
1870	22, 819, 480	164, 430	143, 550	10, 605	51, 387. 50	9, 335
1871	20, 456, 740	254, 650	245, 000	3, 990	68, 375. 00	3, 930
1872	21, 230, 600	244, 500	275, 350	6, 090	52, 575. 00	3, 530
1873	55, 456, 700	173, 680	754, 605	75	512, 562. 50	125, 125
1874	33, 917, 700	799, 270	203, 530	125, 460	9, 850. 00	198, 820
1875	32, 737, 820	78, 350	105, 240	60	30, 050. 00	420
1876	46, 386, 920	104, 280	61, 820	135	23, 052. 50	3, 245
1877	43, 504, 700	211, 490	182, 660	4, 464	92, 630. 00	3, 920
1878	45, 916, 500	1, 031, 440	1, 427, 470	246, 972	1, 160, 650. 00	3, 020
1879	28, 889, 260	6, 120, 320	3, 727, 155	9, 090	331, 225. 00	3, 030
1880	17, 749, 120	21, 715, 160	22, 831, 765	3, 108	7, 490. 00	1, 636
1881	14, 585, 200	48, 796, 250	33, 458, 430	1, 650	1, 700. 00	7, 660
1882	23, 295, 400	24, 740, 640	17, 831, 885	4, 620	10, 100. 00	5, 040
1883	24, 980, 040	2, 595, 400	1, 647, 990	2, 820	4, 900. 00	10, 840
1884	19, 944, 200	2, 110, 800	1, 922, 250	3, 318	4, 982. 50	6, 206
1885	13, 875, 560	4, 815, 270	9, 065, 030	2, 730	2, 217. 50	12, 205
1886	22, 120	10, 621, 600	18, 282, 160	3, 426	10, 220. 00	6, 016
1887	5, 662, 420	8, 706, 800	9, 560, 435	18, 480	15, 705. 00	8, 543
1888	21, 717, 320	8, 030, 310	1, 560, 980	15, 873	40, 245. 00	16, 080
1889	16, 995, 120	4, 298, 850	37. 825	7, 287	44, 120. 00	30, 729
1890	19, 399, 080	755, 430	290, 640	....	22, 032. 50	....
1891	25, 891, 340	1, 956, 000	1, 347, 065	....	27, 600. 00	....
1892	19, 238, 760	9, 817, 400	5, 724, 700	....	6, 362, 50	....
1893	27, 178, 320	20, 132, 450	9, 610, 985	....	75, 265. 00	....
1894	48, 350, 800	26, 032, 780	5, 152, 275	....	10, 305. 00	....
Total	1, 210, 703, 700	259, 127, 230	212, 921, 675	1, 619, 376	28, 681, 005. 00	19, 499, 337

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[1] Includes $175,000 in Columbian coins.

[2] Includes $2,026,052.50 in Columbian coins

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

RECAPITULATION—Continued.

SILVER COINAGE.							
Trade dollars.	Dollars.	Half dollars.	Quarter dollars.	Twenty cents.	Dimes.	Half dimes.	Three cents.
....	$169, 600	$2. 257. 000. 00	$127, 500. 00	....	$3, 130. 00	$1, 350. 00	....
....	140, 750	1, 870, 000. 00	275, 500. 00	....	24, 500. 00	63, 700. 00	....
....	15, 000	1 880, 000. 00	36, 500. 00	....	45, 150. 00	63, 400. 00	....
....	62, 600	1, 781, 000. 00	85, 000, 00	....	113, 900. 00	72, 450. 00	....
....	47, 500	1 341, 500. 00	150. 700. 00	....	244, 150. 00	82, 250. 00	....
....	1, 300	301, 375. 00	62, 000. 00	....	142, 650. 00	82, 050. 00	$185, 022. 00
....	1, 100	110, 565. 00	68, 265. 00	....	196, 550. 00	63, 025. 00	559, 905. 00
....	46, 110	2, 430, 354. 00	4, 146, 555. 00	....	1, 327, 301. 00	785, 251. 00	342, 000. 00
....	33, 140	4. 111, 000. 00	3, 466, 000. 00	....	624, 000. 00	365, 000. 00	20, 130. 00
....	26. 000	2, 288, 725 00	857, 350. 00	....	207, 500. 00	117, 500. 00	4, 170. 00
....	63, 500	1, 903, 500. 00	2, 129, 500. 00	....	703, 000. 00	299, 000. 00	43, 740. 00
....	94, 000	1, 482, 000. 00	2, 726, 500. 00	....	712, 000. 00	433, 000. 00	31, 260. 00
....	....	5, 998, 000. 00	2, 002, 250. 00	....	189, 000. 00	258, 000. 00	48, 120. 00
....	636, 500	2, 074, 000. 00	421, 000. 00	....	97, 000. 00	45, 000. 00	10, 950. 00
....	733, 930	1, 032, 850. 00	312, 350. 00	....	78, 700. 00	92, 950. 00	8, 610. 00
....	78, 500	2, 078, 950. 00	1, 237, 650. 00	....	209, 650. 00	164, 050. 00	14, 940. 00
....	12, 090	802, 175. 00	249, 887. 50	....	102, 830. 00	74, 627. 50	10, 906. 50
....	27, 660	709, 830. 00	48, 015. 00	....	17, 196. 00	5, 923. 00	643. 80
....	31, 170	518, 785. 00	28, 517. 50	....	26, 907. 00	4, 523. 50	14. 10
....	47, 000	593, 450. 00	25, 075. 00	....	18, 550. 00	6, 675. 00	255. 00
....	49, 625	899, 812. 50	11, 381. 25	....	14, 372. 50	6, 536. 25	681. 75
....	60, 325	810, 162. 50	17, 156. 25	....	14, 662. 50	6, 431. 25	138. 75
....	182, 700	769, 100. 00	31, 500. 00	....	72, 625. 00	18, 295. 00	123. 00
....	424, 300	725, 950. 00	23, 150. 00	....	70, 660. 00	21, 930. 00	153. 00
....	445, 462	829, 758. 50	23, 935. 00	....	52, 150. 00	26, 830. 00	120. 00
....	1, 117, 136	1, 741, 655. 00	53, 255. 50	....	109, 371. 00	82, 493. 00	127. 80
....	1, 118, 600	866, 775. 00	68, 762. 50	....	261, 045. 00	189, 247. 50	58. 50
$1,225,000	296, 600	1, 593, 780. 00	414, 190. 50	....	443, 329. 10	51, 830. 00	18. 00
4,910,000	....	1, 406, 650. 00	215, [illegible]5. 00	....	319, 151. 70	....	....
6,279,600	....	5, 117, 750. 00	1, 278, 375. 00	$265, 598	2, 406, 570. 00	....	....
6,192,150	....	7, 451, 575. 00	7, 839, 287. 50	5, 180	3, 015, 115. 00	....	....
13,092,710	....	7, 540, 255. 00	6, 024, 927. 50	102	1, 735, 051. 00	....	....
4,259,900	22, 495, 550	726, 200. 00	849, 200. 00	120	187, 880. 00	....	....
1,541	27, 560, 100	2, 950. 00	3, 675. 00	....	1, 510. 00	....	....
1,987	27, 397, 355	4. 877. 50	3, 738. 75	....	3, 735. 50	....	....
960	27, 927, 975	5, 487. 50	3, 243, 75	....	2, 497. 50	....	....
1,097	27, 574, 100	2, 750. 00	4, 075. 00	....	391, 110. 00	....	....
979	28, 470, 039	4, 519. 50	3, 859. 75	....	767, 571. 20	....	....
....	28, 136, 875	2, 637. 50	2, 218. 75	....	393, 134. 90	....	....
....	28, 697, 767	3, 065. 00	3, 632. 50	....	257, 711. 70	....	....
....	31, 423, 886	2, 943. 00	1, 471. 50	....	658, 409, 40	....	....
....	33, 611, 710	2, 855. 00	2, 677. 50	....	1, 573, 838. 90	....	....
....	31, 990, 833	6, 416. 50	306, 708. 25	....	721, 648. 70	....	....
....	34, 651, 811	6, 355. 50	3, 177. 75	....	835, 338. 90	....	....
....	38, 043, 004	6, 295, 00	20, 147. 50	....	1, 133, 461. 70	....	....
....	23, 562, 735	100. 300. 00	1, 551, 150. 00	....	2, 304, 671. 60	....	....
....	6, 333, 245	[1] 1, 652, 136. 50	2, 960, 331. 00	....	1, 695, 365. 50	....	....
....	1, 455, 792	[2] 4, 003, 948. 50	[3] 2, 583, 837. 50	....	759, 219. 30	....	....
....	3, 093, 972	3, 667, 831. 00	2, 233, 448. 25	....	205, 099. 60	....	....
35,965,924	430, 457, 987	132, 259. 051. 00	48, 183, 179. 25	271, 000	28, 610, 171. 30	4,880.219.40	1, 282, 087. 20

[3] Includes $10,005.75 in Columbian coins.

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES

RECAPITULATION—Continued.

Calendar year.	MINOR COINAGE.		
	Five cents.	Three cents.	Two cents.
1793–1795			
1796			
1797			
1798			
1799			
1800			
1801			
1802			
1803			
1804			
1805			
1806			
1807			
1808			
1809			
1810			
1811			
1812			
1813			
1814			
1815			
1816			
1817			
1818			
1819			
1820			
1821			
1822			
1823			
1824			
1825			
1826			
1827			
1828			
1829			
1830			
1831			
1832			
1833			
1834			
1835			
1836			
1837			
1838			
1839			
1840			
1841			
1842			
1843			
1844			
1845			
1846			

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

RECAPITULATION—Continued.

MINOR COINAGE.		TOTAL COINAGE.			TOTAL VALUE.
Cents.	Half cents.	Gold.	Silver.	Minor.	
$10,660.33	$712.67	$71,485.00	$370,683.80	$11,373.00	$453,541.80
9,747.00	577.40	77,960.00	77,118.50	10,324.40	165,402.90
8,975.10	535.24	128,190.00	14,550.45	9 510.34	152,250.79
9,797.00	....	205,610.00	330,291.00	9.797.00	545,698.00
9,045.85	60.83	213,285.00	423,515.00	9,106.68	645,906.68
28,221.75	1,057.65	317,760.00	224,296.00	29.279.40	571,335.40
13,628.37	....	422,570.00	74,758.00	13,628.37	510,956.37
34,351.00	71.83	423,310.00	58,343.00	34.422.83	516,075.83
24,713.53	489.50	258,377.50	87,118.00	25.203.03	370.698.53
7,568.38	5,276.56	258,642.50	100,340.50	12,844.94	371,827.94
9,411.16	4,072.32	170,367.50	149,388.50	13,483.48	333,239.48
3,480.00	1,780.00	324,505.00	471,319.00	5,260.00	801,084.00
7,272.21	2,380.00	437,495.00	597,448.75	9,652.21	1,044,595.96
11,090.00	2,000.00	284,665.00	684,300.00	13,090.00	982,055.00
2,228.67	5,772.86	169,375.00	707,376.00	8,001.53	884,752.53
14,585.00	1,075.00	501,435.00	638,773.50	15,660.00	1,155,868.50
2,180.25	315.70	497,905.00	608,340.00	2,495.95	1,108,740.95
10,755.00	....	290,435.00	814,029.50	10,755.00	1,115,219.50
4,180.00	....	477,140.00	620,951.50	4,180.00	1,102,271.50
3,578.30	....	77,270.00	561,687.50	3,578.30	642,535.80
....	....	3,175.00	17,308.00	....	20,483.00
28,209.82	....	....	28,575.75	28.209.82	56,785.57
39,484.00	....	....	607,783.50	39,484.00	647,267.50
31,670.00	....	242,940.00	1,070,454.50	31,670.00	1,345,064.50
26,710.00	....	258,615.00	1,140,000.00	26,710.00	1,425.325.00
44,075.50	....	1,319,030.00	501,680.70	44,075.50	1,864,786.20
3,890.00	....	189,325.00	825,762.45	3,890.00	1,018,977.45
20,723.39	....	88,980.00	805,806.50	20,723.39	915,509.89
....	....	72,425.00	895,550.00	....	967,975.00
12,620.00	....	93,200.00	1,752,477.00	12,620.00	1,858,297.00
14,611.00	315.00	156,385.00	1,564,583.00	14,926.00	1,735,894.00
15,174.25	1,170.00	92,245.00	2,002,090.00	16,344.25	2,110,679.25
23,577.32	....	131,565.00	2,869,200.00	23,577.32	3,024,342.32
22,606.24	3,030.00	140,145.00	1,575,600.00	25,636.24	1,741,381.24
14,145.00	2,435.00	295,717.50	1,994,578.00	16,580.00	2,306,875.50
17,115.00	....	643,105.00	2,495,400.00	17,115.00	3,155,620.00
33,592.60	11.00	714,270.00	3,175,600.00	33,603.60	3,923,473.60
23,620.00	....	798,435.00	2,579,000.00	23,620.00	3,401,055.00
27,390.00	770.00	978,550.00	2,759,000.00	28,160.00	3,765,710.00
18,551.00	600.00	3,954,270.00	3,415,002.00	19.151.00	7,388,423.00
38,784.00	705.00	2,186,175.00	3,443,003.00	39,489.00	5,668,667.00
21,110.00	1,990.00	4,135,700.00	3,606,100.00	23,100.00	7,764,900.00
55,583.00	....	1,148,305.00	2,096,010.00	55,583.00	3,299,898.00
63,702.00	....	1,809,765.00	2,333,243.40	63,702.00	4,206,710.40
31,286.61	....	1,376,847.50	2,209,778.20	31,286.61	3,617,912.31
24,627.00	....	1,675,482.50	1,726,703.00	24,627.00	3,426,812.50
15,973.67	....	1,091,857.50	1,132,750.00	15,973.67	2,240,581.17
23,833.90	....	1,829,407.50	2,332,750.00	23,833.90	4,185,991.40
24,283.20	....	8,108,797.50	3,834,750.00	24,283.20	11,967,830.70
23,987.52	....	5,427,670.00	2,235,550.00	23,987.52	7,687,207.52
38,948.04	....	3,756,447.50	1,873,200.00	38,948.04	5,668,595.54
41,208.00	....	4,034,177.50	2,558,580.00	41,208.00	6,633,965.50

XXXI.—COINAGE OF THE MINTS OF THE UNITED STATES

RECAPITULATION—Continued.

Calendar year.	MINOR COINAGE.		
	Five cents.	Three cents.	Two cents.
1847			
1848			
1849			
1850			
1851			
1852			
1853			
1854			
1855			
1856			
1857			
1858			
1859			
1860			
1861			
1862			
1863			
1864			$396, 950. 00
1865		$341, 460. 00	272, 800. 00
1866	$737, 125. 00	144, 030. 00	63, 540. 00
1867	1, 545, 475. 00	117, 450. 00	58, 775. 00
1868	1, 440, 850. 00	97, 560. 00	56, 075. 00
1869	819, 750. 00	48, 120. 00	30, 930. 00
1870	240, 300. 00	40, 050. 00	17, 225. 00
1871	28, 050. 00	18, 120. 00	14, 425. 00
1872	301, 800. 00	25, 860. 00	1, 300. 00
1873	227, 500. 00	35, 190. 00	
1874	176, 900. 00	23, 700. 00	
1875	104, 850. 00	6, 840. 00	
1876	126, 500. 00	4, 860. 00	
1877			
1878	117. 50	70. 50	
1879	1, 455. 00	1, 236. 00	
1880	997. 75	748. 65	
1881	3, 618. 75	32, 417. 25	
1882	573, 830. 00	759. 00	
1883	1, 148, 471. 05	318. 27	
1884	563, 697. 10	169. 26	
1885	73, 824. 50	143. 70	
1886	166, 514. 50	128. 70	
1887	763, 182. 60	238. 83	
1888	536, 024. 15	1, 232. 49	
1889	794, 068. 05	646. 83	
1890	812, 963. 60		
1891	841, 717. 50		
1892	581, 982. 10		
1893	668, 509. 75		
1894	270, 656. 60		
Total	13, 553, 730. 50	941, 349. 48	912, 020. 00

FROM THEIR ORGANIZATION, BY CALENDAR YEARS—Continued.

RECAPITULATION—Continued.

MINOR COINAGE.		TOTAL COINAGE.			TOTAL VALUE.
Cents.	Half cents.	Gold.	Silver.	Minor.	
$61, 836. 69	....	$20, 202, 325. 00	$2, 374, 450. 00	$61, 836. 69	$22, 638, 611. 69
64, 157. 99	....	3, 775, 512. 50	2, 040, 050. 00	64, 157. 99	5, 879, 720. 49
41, 785. 00	$199. 32	9, 007, 761. 50	2, 114, 950. 00	41, 984. 32	11, 164, 695. 82
44, 268. 44	199. 06	31, 981, 738. 50	1, 866, 100. 00	44, 467. 50	33, 892, 306. 00
98, 897. 07	738. 36	62, 614, 492. 50	774, 397. 00	99, 635. 43	63, 488, 524. 93
50, 630. 94	....	56, 846, 187. 50	999, 410. 00	50, 630. 94	57, 896, 228. 44
66, 411. 31	648. 47	39, 377, 909. 00	9, 077, 571. 00	67, 059. 78	48, 522, 539. 78
42, 361. 56	276. 79	25, 915, 962. 50	8, 619, 270. 00	42, 638. 35	34, 577, 870. 85
15, 748. 29	282. 50	29, 387, 968. 00	3, 501, 245. 00	16, 030. 79	32, 905, 243. 79
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